IMP5

December 17, 2020

Contents

1 IMP5 - Heating, current drive and fast particles

The aim of the Integrated Modelling Project #5 on Heating, Current Drive and Fast Particles is to develop a package of codes for prediction [1] and interpretation of heating, current drive and fast particle effects. The areas to be covered include ECRH, ICRH, NBI, LH, alpha particles and fast particle interaction with instabilities. The ultimate goal is to enable self-consistent simulation of heating and current drive in the presence of fast particle instabilities, especially for ITER.

A self-consistent treatment of all possible heating scenarios is a very challenging problem with current modelling capabilities. Owing to the vastly different time scales for wave propagation and the evolution of distribution functions, simulations of heating and current drive can, in general, be obtained by combining codes solving the wave fields at time slices with codes evolving the distribution functions between the time slices. The goal is to have at least one module for each physics area at two levels: one basic and less detailed enabling fast computations, and one advanced, but computationally expensive, enabling detailed computations of the distribution functions of electrons and ions during heating and current drive, ultimately incorporating non-linear effects of instabilities and their redistribution fast ions.

In 2010, the work on adapting code modules to ITM requirements will be consolidated such that essential modules are available for providing the necessary input to the transport solver ETS (IMP3 [2]). The data structures relating to the physics of Heating and Current drive and fast particle physics will be improved further. New modules will be considered and adapted to the ITM standards. When more than one module of a certain type is available, work on cross verification [3] will start.

2 Project Leadership

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3 IMP5 Tasks for 2012

3.1 WP12-ITM-IMP5-ACT1

Topic: Creation, testing and benchmarking of Kepler Actors from Heating, Current Drive and Fast Particle Physics codes for use in ITM workflows.

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[1] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_prediction
[2] https://www.efda-itm.eu/ITM/html/imp3_public.html
[3] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_verification

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3.2 WP12-ITM-IMP5-ACT2

Topic: Integration of IMP5 modules in ITM workflows

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3.3 WP12-ITM-IMP5-ACT3

Topic: Development and integration of models for synergies between heating schemes and self-consistent coupling of IMP5 heating codes

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Table 3: Participants

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3.4 WP12-ITM-IMP5-ACT4

Topic: Fast particle codes

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3.5 Tasks in the 2010 Work Programme

The list of IMP5 related tasks for 2010.

3.5.1 WP10-ITM-IMP5-ACT1

Topic: Adaptation of IMP5 codes for use with ITM tools

Priority Support Deliverables:

- The codes that will part of the IMP5 set during 2010 should be identified.

- For each code a schedule for release and other milestones associated with it should specified.

- A code under the ITM svn server adapted to ITM standards, i.e. communicating data via CPOs [4] .

- Documentation of the code including information on verification [5] or references to work where verification has been demonstrated.

- The codes participating in the benchmarking task will be adapted to the ITM data structures and ported on the ITM code platform.

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[4] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo
[5] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_verification

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3.5.2 WP10-ITM-IMP5-ACT2

Topic: IMP5 data structure

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3.5.3 WP10-ITM-IMP5-ACT3

Topic: Benchmarking and validation of codes

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[6] https://www.efda-itm.eu/ITM/html/fulvio.zonca@enea.it

3.5.4 WP10-ITM-IMP5-ACT4

Topic: Development of an advanced 3D ion Fokker-Planck solver for ions

Priority Support Deliverables:

- A document defining the agenda for a Working Session on the Task, which also sets out the options to be discussed.

- Progress report on the developments within the task.

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3.5.5 WP10-ITM-IMP5-ACT5

Topic: Code for Alfvén Modes

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3.5.6 WP10-ITM-IMP5-ACT6

Topic: Data joiners

Priority Support Deliverables:

- A code under the ITM svn server adapted to ITM standards and running in Kepler [7] , joining data from wave deposition codes for input to Fokker-Planck codes. The module should be documented.

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3.5.7 Project timeline

Gantt Chart for the IMP5 timeline (open with e.g. OpenProject or GanttProject) :

[7] `https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_kepler`

imp5_gantt_chart.xml [8](imp5_gantt_chart.pdf [9])

last update: 2015-07-23 by tjohnson

3.6 Tasks in the 2011 Work Programme

3.6.1 WP11-ITM-IMP5-ACT1

Topic: Adaptation of codes for Heating, Current Drive and Fast Particle Physics for use with ITM tools

Subtask 1 - Priority Support Deliverables:

- Code adaptation up to creation of a Kepler actor (for new codes)

Subtask 2 - Baseline Support Deliverables:

- Code adaptation up to creation of a Kepler actor (for people finishing off their planned for 2010)

Subtask 3 - Priority Support Deliverables:

- Kepler actor and test workflow

- Code documentation for developers and maintainers, and User documentation (Phase IV)

- Adaptation to version 4.08c of the data structures; to be completed within 3 months from the release of version 4.08c of the data structures

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[8] https://www.efda-itm.eu/ITM/imports/imp5/public/project_management/imp5_gantt_chart.xml
[9] https://www.efda-itm.eu/ITM/imports/imp5/public/project_management/imp5_gantt_chart.pdf
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3.6.2 WP11-ITM-IMP5-ACT2

Topic: Integration of IMP5 modules with the European transport Solver ETS

Priority Support Deliverables:

- Development of Composite Actors for coupling IMP5 codes to the ETS. – Develop composite actors for the ETS; – Develop workflows for testing the composite actors; – Develop standard test cases for the composite actors.

- Development of datajoiners, i.e. modules merging the information in IMP5 related CPOs. Develop datajoiners of two types to: – merge two CPOS of the same kind, e.g. from two wave codes writing the waves-CPO for EC and LH waves; – generate the coresource-CPO by merging the CPOs distribution, distsource and waves.

- Development of modules for workflow orchestration. The IMP5 composite actor should look the same for many types of scenarios. This means that for many ETS simulations not all codes should be run. These routines should provide decision on what codes need running in a specific ETS simulations, i.e. they should take CPO and Kepler parameters as input and output Kepler parameters. Note that these modules are only needed when they cannot be replaced by a simple KEPLER composite actor.

- Application, adaptation and development of the composite actors in 1. for integrated workflows suitable to cross-project integration efforts, e.g. coupling equilibrium reconstruction (from remote data via exp2itm) and HCD chain. – Develop composite actors and workflows for integration of ITM codes and testing. – Reports on testing of the composite actors and workflows.

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3.6.3 WP11-ITM-IMP5-ACT3

Topic: Benchmarking and validation of codes

Priority Support Deliverables:

- Deliver report including a detailed description of verification or validation procedure and results.

- Publications, or conference contributions

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3.6.4 WP11-ITM-IMP5-ACT4

Topic: Development and integration of models for synergies between heating schemes and self-consistent coupling of IMP5 heating codes

Subtask 1:

- Synergies: Fokker-Planck modeling including both sources of beam ions and alpha particle and interactions with ICRF and LH wave fields.

[46] https://www.efda-itm.eu/ITM/html/rbb@ipp.mpg.de
[47] https://www.efda-itm.eu/ITM/html/thomas.johnson@ee.kth.se
[48] https://www.efda-itm.eu/ITM/html/mireille.schneider@cea.fr
[49] https://www.efda-itm.eu/ITM/html/Yves.PEYSSON@cea.fr
[50] https://www.efda-itm.eu/ITM/html/remi.dumont@cea.fr
[51] https://www.efda-itm.eu/ITM/html/figini@ifp.cnr.it
[52] https://www.efda-itm.eu/ITM/html/sergio.briguglio@enea.it
[53] https://www.efda-itm.eu/ITM/html/claudio.ditroia@enea.it
[54] https://www.efda-itm.eu/ITM/html/rbb@ipp.mpg.de
[55] https://www.efda-itm.eu/ITM/html/Emanuele.Poli@ipp.mpg.de
[56] https://www.efda-itm.eu/ITM/html/seppo.sipila@tkk.fi
[57] https://www.efda-itm.eu/ITM/html/thomas.johnson@ee.kth.se
[58] https://www.efda-itm.eu/ITM/html/thel@kth.se
[59] https://www.efda-itm.eu/ITM/html/gregorio.vlad@enea.it
[60] https://www.efda-itm.eu/ITM/html/giuliana.fogaccia@enea.it
[61] https://www.efda-itm.eu/ITM/html/pwl@ipp.mpg.de
[62] https://www.efda-itm.eu/ITM/html/antti.snicker@tkk.fi
[63] https://www.efda-itm.eu/ITM/html/erik.sunden@physics.uu.se
[64] https://www.efda-itm.eu/ITM/html/otto.asunta@tkk.fi

Subtask 2:

- Synergies: Fokker-Planck modeling including interactions with EC, LH and ICRF wave fields.

Subtask 3:

- Quasilinear coupling of wave and kinetic plasma model by inclusion of a non- Maxwellian in the plasma susceptibility. This includes both the evaluation of the dielectric response from a general distribution function taken from the DISTIRIBUTION CPO and adaptation of wave codes to use this response.

Priority Support Deliverables:

- Actors and source code with documentation; all stored under Gforge-svn. Documentation of tests verifying the functionality of the source. Source code should follow good ITM practice.

- Workflows for performing modelling of synergies and self-consistent coupling between codes.

Table 14: Participants

Name	Association	e-mail
Remi Dumont	CEA	remi.dumont@cea.fr [65]
Mireille SCHNEIDER	CEA	mireille.schneider@cea.fr [66]
Roberto Bilato	IPP	rbb@ipp.mpg.de [67]
Gyorgy Steinbrecher	MEdC	steinbrechergyorgy@yahoo.com [68]
Antti Salmi	TEKES	antti.salmi@tkk.fi [69]
Thomas Johnson	VR	thomas.johnson@ee.kth.se [70]
Torbjorn Hellsten	VR	thel@kth.se [71]

3.6.5 WP11-ITM-IMP5-ACT5

Topic: Code development and datastructure evaluation for global stability analyses of Alfven Modes in realistic geometries and in the presence of non-perturbative fast ion excitations

Priority Support Deliverables:

- Complete code debugging of numerics and physics

- Evaluation of suitable datastructure for energetic particle distribution function, with reference to initial particle loading and after nonlinear saturation

Table 15: Participants

Name	Association	e-mail
Gregorio Vlad	ENEA-Frascati	gregorio.vlad@enea.it [72]
Sergio Briguglio	ENEA-Frascati	sergio.briguglio@enea.it [73]
Giuliana Fogaccia	ENEA-Frascati	giuliana.fogaccia@enea.it [74]
Fulvio Zonca	ENEA-Frascati	fulvio.zonca@enea.it [75]

3.6.6 WP11-ITM-IMP5-ACT6

Topic: Development of codes calculating nuclear reaction rates

Baseline Support Deliverables:

- Source code with documentation; all stored under Gforge. Documentation of tests verifying the functionality of the source. Source code should follow good ITM practice.

[65] https://www.efda-itm.eu/ITM/html/remi.dumont@cea.fr
[66] https://www.efda-itm.eu/ITM/html/mireille.schneider@cea.fr
[67] https://www.efda-itm.eu/ITM/html/rbb@ipp.mpg.de
[68] https://www.efda-itm.eu/ITM/html/steinbrechergyorgy@yahoo.com
[69] https://www.efda-itm.eu/ITM/html/antti.salmi@tkk.fi
[70] https://www.efda-itm.eu/ITM/html/thomas.johnson@ee.kth.se
[71] https://www.efda-itm.eu/ITM/html/thel@kth.se
[72] https://www.efda-itm.eu/ITM/html/gregorio.vlad@enea.it
[73] https://www.efda-itm.eu/ITM/html/sergio.briguglio@enea.it
[74] https://www.efda-itm.eu/ITM/html/giuliana.fogaccia@enea.it
[75] https://www.efda-itm.eu/ITM/html/fulvio.zonca@enea.it

Table 16: Participants

Name	Association	e-mail
Mireille SCHNEIDER	CEA	mireille.schneider@cea.fr [76]
Simppa Akaslompolo	TEKES	simppa.akaslompolo@tkk.fi [77]
Otto Asunta	TEKES	otto.asunta@tkk.fi [78]
Erik Andersson Sundn	VR	erik.sunden@physics.uu.se [79]
Klaus Schopf	OAW	Klaus.Schoepf@uibk.ac.at [80]
Viktor Goloborod'ko	OAW	V.Goloborodko@uibk.ac.at [81]
Victor Yavorskij	OAW	Victor.Yavorskij@uibk.ac.at [82]

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last update: 2012-01-10 by tjohnson

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last update: 2015-07-23 by tjohnson

4 List of IMP5 codes

The following list lists the codes and modules which are part of ITM-TF tasks and their responsible officers.
A number of IMP5 codes have projects on gforge [83].
Update the code status here [84].

4.1 Electron heating codes

4.1.1 EC wave codes

- TORAY-FOM, E. Westerhof, FOM (code status [85], codeparam [86])
- TORBEAM, E. Poli, IPP-Garching (code status [87])
- GRAY, L. Figini, ENEA-CNR (code status [88], gforge [89], codeparam [90])
- TRAVIS, N. B. Marushchenko, IPP-Greifswald (code status [91], gforge [92])

4.1.2 LH wave codes

- RAYLH, A. Cardinali, EURATOM-ENEA (code status [93])

[76] https://www.efda-itm.eu/ITM/html/mireille.schneider@cea.fr
[77] https://www.efda-itm.eu/ITM/html/simppa.akaslompolo@tkk.fi
[78] https://www.efda-itm.eu/ITM/html/otto.asunta@tkk.fi
[79] https://www.efda-itm.eu/ITM/html/erik.sunden@physics.uu.se
[80] https://www.efda-itm.eu/ITM/html/Klaus.Schoepf@uibk.ac.at
[81] https://www.efda-itm.eu/ITM/html/V.Goloborodko@uibk.ac.at
[82] https://www.efda-itm.eu/ITM/html/Victor.Yavorskij@uibk.ac.at
[83] https://gforge6.eufus.eu/project/?action=ProjectTroveBrowse&_trove_category_id=312
[84] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM
[85] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=TORAY-FOM&SUBMIT=Submit+Query
[86] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_torayfom.html
[87] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=TORBEAM&SUBMIT=Submit+Query
[88] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=GRAY&SUBMIT=Submit+Query
[89] https://gforge6.eufus.eu/project/gray/
[90] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_gray.html
[91] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=TRAVIS&SUBMIT=Submit+Query
[92] https://gforge6.eufus.eu/project/gray/
[93] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=RAYLH&SUBMIT=Submit+Query

4.1.3 Combined EC and LH wave codes

- C3PO, Y. Peysson, CEA (Cadarache) (code status [94])

4.1.4 Combined electron Fokker-Planck codes

- RELAX, E. Westerhof, FOM (code status [95])
- LUKE, Y. Peysson (code status [96], gforge [97])

4.1.5 LH coupling

- ALOHA, J. Hillairet, CEA (Cadarache) (code status [98], gforge [99])

4.1.6 Time domain wave codes

- FWTOR, C. Tsironis, Hellenic Association (code status [100], gforge [101])

4.2 Ion heating codes

4.2.1 Wave codes for ion cyclotron heating

- TORIC, R. Bilato, IPP-Garching (code status [102], gforge [103])
- EVE, R. Dumont, CEA (Cadarache) (code status [104], gforge [105])
- LION, O. Sauter, CRPP
- Cyrano, E. Lerche, ERM/KMS
- ICCOUP, T. Johnson, VR (gforge [106])

4.2.2 Fokker-Planck codes for ion cyclotron heating

- FPSIM, L.-G. Eriksson, EC (code status [107], gforge [108])
- SSFPQL, R. Bilato, IPP-Garching (code status [109])
- RFOF, T. Johnson, VR (gforge [110], documentation [111], codeparam [112])

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[94] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=C3PO&SUBMIT=Submit+Query
[95] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=RELAX&SUBMIT=Submit+Query
[96] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=LUKE&SUBMIT=Submit+Query
[97] https://gforge6.eufus.eu/project/luke/
[98] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=C3PO&SUBMIT=Submit+Query
[99] https://gforge6.eufus.eu/project/aloha/
[100] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=FWTOR&SUBMIT=Submit+Query
[101] https://gforge6.eufus.eu/project/spot/
[102] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=TORIC&SUBMIT=Submit+Query
[103] https://gforge6.eufus.eu/project/toric/
[104] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=EVE&SUBMIT=Submit+Query
[105] https://gforge6.eufus.eu/project/eve/
[106] https://gforge6.eufus.eu/project/fpsim/
[107] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=fpsim&SUBMIT=Submit+Query
[108] https://gforge6.eufus.eu/project/fpsim/
[109] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=SSFPQL&SUBMIT=Submit+Query
[110] https://gforge6.eufus.eu/project/rfof/
[111] https://portal.eufus.eu/documentation/ITM/doxygen/imp5/rfof/docs/
[112] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_rfof.html

- Stix_Redist, E. Lerche and D. Van Eester (gforge [113], codeparam [114])
- Stix_Disp, E. Lerche and D. Van Eester (gforge [115])

4.2.3 NBI sources for Fokker-Planck codes

- BBNBI (Beamlet-based NBI module of ASCOT), O. Asunta, TEKES (code status [116], gforge [117])
- NEMO, M. Schneider, CEA (Cadarache) (code status [118], gforge [119],
- SNBI (OAW NBI source), K. Schöpf, OAW (code status [120])

4.2.4 Nuclear sources (input for Fokker-Planck codes)

- Nuclearsim, T.Johnson, VR (gforge [121], codeparam [122])

4.2.5 NBI Fokker-Planck codes

- RISK, M. Schneider, CEA (Cadarache) (code status [123], gforge [124])
- NBISIM, T. Johnson, VR
- FIDIT, K. Schöpf, OAW (code status [125])

4.2.6 Advanced codes

(The following codes include either the synergy between IC and NBI heating, or include both wave field and Fokker-Planck solver)

- ASCOT, S. Sipila, TEKES (code status [126], gforge [127], codeparam [128])
- SPOT, M. Schneider, CEA (Cadarache) (code status [129], gforge [130])
- SELFO-light, T. Hellsten, VR (code status [131], gforge [132])

[113] https://gforge6.eufus.eu/project/stixredist/
[114] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_stix_redist.html
[115] https://gforge6.eufus.eu/project/stixredist/
[116] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=BBNBI&SUBMIT=Submit+Query
[117] https://gforge6.eufus.eu/project/bbnbi/
[118] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=NEMO&SUBMIT=Submit+Query
[119] https://gforge6.eufus.eu/project/nemo/
[120] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=SNBI&SUBMIT=Submit+Query
[121] https://gforge6.eufus.eu/project/nbisim/
[122] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_nuclearsim.html
[123] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=RISK&SUBMIT=Submit+Query
[124] https://gforge6.eufus.eu/project/risk/
[125] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=FIDIT&SUBMIT=Submit+Query
[126] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=ASCOT&SUBMIT=Submit+Query
[127] https://gforge6.eufus.eu/project/ascot/
[128] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_ascot.html
[129] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=spot&SUBMIT=Submit+Query
[130] https://gforge6.eufus.eu/project/spot/
[131] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=SELFO-light&SUBMIT=Submit+Query
[132] https://gforge6.eufus.eu/project/selfolight/

4.2.7 Orbit tracing codes

- SOFI, S. Sipila, TEKES (code status [133], gforge [134])
- OAW Orbit Following Monte Carlo, K. Schöpf, OAW (code status [135])

4.3 Fast particle codes

4.3.1 Codes for fast ion-MHD interactions

- LIGKA, P. Lauber, IPP-Garching (code status [136])
- MARS, G. Vlad, ENEA-Frascati (code status [137], gforge [138])
- HYMAGYC, G. Vlad, ENEA-Frascati (code status [139])
- HMGC, C. Di Troia, ENEA-Frascati (code status [140])
- LEMAN, W.A. Cooper, EPFL-CRPP (code status [141])

4.3.2 Runaway electrons

- ARENA, G. Pokol and G. Csepany (code status [142], gforge [143])

4.4 Code parameter documentation

4.4.1 addICant

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: IC antennas: parameters

Namespace:

4.4.1.1 Code parameter tree

Name	Type	Restrictions
/general	--Directory--	Frequency and power
frequency	float	frequency [Hz]
power	float	Coupled power [W]
/straps	--Directory--	Strap specific parameters; strap geometry asnd phasing
nstrap	integer	Number of straps

[133] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=SOFI&SUBMIT=Submit+Query

[134] https://gforge6.eufus.eu/project/sofi/

[135] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=AWOrbitFollowingMonteCarlo&SUBMIT=Submit+Query

[136] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=LIGKA&SUBMIT=Submit+Query

[137] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=MARS&SUBMIT=Submit+Query

[138] https://gforge6.eufus.eu/project/marsgw/

[139] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=HYMAGYC&SUBMIT=Submit+Query

[140] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=HMGC&SUBMIT=Submit+Query

[141] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=LEMAN&SUBMIT=Submit+Query

[142] http://solps-mdsplus.aug.ipp.mpg.de:8080/ITM/specific_code_report?specific_codename=ARENA&SUBMIT=Submit+Query

[143] https://gforge6.eufus.eu/project/arena/

Name	Type	Restrictions
phase	FloatList	Feeding phase [rad]
phi_centre	FloatList	Toroidal angle of antenna position [rad]
width	FloatList	Strap width [m]
dist2wall	FloatList	Distance strap-wall [m]
ncoord_strap	integer	Number of points to describe the poloidal strap extension (?)
coord_strap_r	FloatList	R coordinate of strap position [m]
coord_strap_z	FloatList	Z coordinate of strap position [m]
verbosity	nonNegativeInteger	Regulates the amount of standard output. 0 - only error messages; 1 - give warnings messages; 2 - idenitify start and end of code; 3 - Main results; 4 - Detailed logging.

4.4.1.2 Locally defined types

Name	Type	Descriptions
FloatList	float	

---

last update: 2015-08-07 by dpc

4.4.2 addECant

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace:

4.4.2.1 Code parameter tree

Name	Type	Restrictions
/mirror	--Directory--	
alpha	float	
beta	float	
x0	float	
y0	float	
z0	float	
/beam	--Directory--	
frequency	float	Min(<): 0
power	float	Min(<): 0
i_mode	integer	
w0_x	float	Min(<): 0
w0_y	float	Min(<): 0
dist_w0_x	float	

Name	Type	Restrictions
dist_w0_y	float	
spot_rot	float	
phase_rot	float	
verbosity	nonNegativeInteger	Regulates the amount of standard output. 0 - only error messages; 1 - give warnings messages; 2 - idenitify start and end of code; 3 - Main results; 4 - Detailed logging.

4.4.2.2 Locally defined types

Name	Type	Descriptions
nonNegativeInteger	integer	Min(<=): 0

---

last update: 2015-08-07 by dpc

4.4.3 nbifiller

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace:

4.4.3.1 Code parameter tree

Name	Type	Restrictions
number_of_injectors	integer	Number of injector (vector length of mass, charge, power...)
r_inj_surface	FloatList	Major radius at the centre of the injection surface [m]
z_inj_surface	FloatList	Vertical coordinate at the centre of the injection surface [m]
phi_inj_surface	FloatList	Toroidal angle at the centre of the injection surface [rad]
tang_rad	FloatList	Tangency radius (major radius where the central line of a NBI unit is tangent to a circle around the symmetry axis)
angle	FloatList	Angle of inclination between a line at the centre of the injection unit surface and the horiontal plane
direction	integer	Direction of the beam seen from above the torus: -1 = clockwise; 1 = counter clockwise
div_vert	FloatList	Beam divergence for a unit in the vertical direction [rad]
div_horiz	FloatList	Beam divergence for a unit in the horizontal direction [rad]
focal_len_hz	FloatList	Horizontal focal length along the beam line [m]
focal_len_vc	FloatList	Vertical focal length along the beam line [m]
n_beamlet	integer	Number of beamlets
r_beamlet	FloatList	Major radius coordinate at the beamlet centre [m]
z_beamlet	FloatList	Vertical coordinate at the beamlet centre [m]
phi_beamlet	FloatList	Toroidal coordinate at the beamlet centre [rad]
tangent_radius_beamlet	FloatList	Tangency radius of the beamlet [m]
angle_beamlet	FloatList	Angle of inclination between the beamlet and the horiontal plane [rad]
power_fraction_beamlet	FloatList	Power fraction beamlet

Name	Type	Restrictions
verbosity	nonNegativeInteger	Regulates the amount of standard output. 0 - only error messages; 1 - give warnings messages; 2 - idenitify start and end of code; 3 - Main results; 4 - Detailed logging.

4.4.3.2 Locally defined types

Name	Type	Descriptions
FloatList	float	
int4geometrySelection	integer	Min(<=): 0

last update: 2015-08-07 by dpc

4.4.4 writeECant

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace: `https://gforge6.eufus.eu/svn/imp5tool/trunk/cpogenerators/writeECant`

4.4.4.1 Code parameter tree

Name	Type	Restrictions
/mirror	--Directory--	
alpha	float	poloidal angle (deg)
beta	float	poloidal angle (deg)
x0	float	x0 (cm) at mirror
y0	float	y0 (cm) at mirror
z0	float	z0 (cm) at mirror
/beam	--Directory--	
frequency	float	frequency (GHz) Min(<): 0
power	float	injected power (MW) Min(<): 0
i_mode	integer	1=OM, 2=XM
w0_x	float	waist (cm) x axis Min(<): 0
w0_y	float	waist (cm) y axis Min(<): 0
dist_w0_x	float	mirror-w0x dist (cm), >0 towards plasma
dist_w0_y	float	mirror-w0y dist (cm), >0 towards plasma
spot_rot	float	spot ellipse rotation (deg)
phase_rot	float	phase ellipse rotation (deg)

last update: 2019-01-31 by g2dpc

4.4.5 writeICant

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: IC antennas: parameters

Namespace:

4.4.5.1 Code parameter tree

Name	Type	Restrictions
/general	--Directory--	Frequency and power
frequency	float	frequency [Hz]
power	float	Coupled power [W]
/straps	--Directory--	Strap specific parameters; strap geometry asnd phasing
nstrap	integer	Number of straps
phase	FloatList	Feeding phase [rad]
phi_centre	FloatList	Toroidal angle of antenna position [rad]
width	FloatList	Strap width [m]
dist2wall	FloatList	Distance strap-wall [m]
ncoord_strap	integer	Number of points to describe the poloidal strap extension (?)
coord_strap_r	FloatList	R coordinate of strap position [m]
coord_strap_z	FloatList	Z coordinate of strap position [m]

4.4.5.2 Locally defined types

Name	Type	Descriptions
FloatList	float	

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last update: 2012-03-28 by tjohnson

4.4.6 codeparam2nbi

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace: `https://gforge6.eufus.eu/svn/imp5tool/trunk/cpogenerators/codeparam2nbi`

4.4.6.1 Code parameter tree

Name	Type	Restrictions
/injector_setting	--Directory--	
mass	float	Mass of injected species
charge	float	Charge of injected species
power	float	Injected power [W]
power_fraction_2	FloatList	Fraction of power of second harmonic energy injection

Name	Type	Restrictions
power_fraction_3	FloatList	Fraction of power of third harmonic energy injection
energy	float	Nominal ijection energy [eV]
select_preset_geometry	int4geometrySelection	Select geoemtry source; 1: ITER, 2: JET, 0: manual geometry input from xml
/injector_geometry	--Directory--	
r_inj_surface	FloatList	Major radius at the centre of the injection surface [m]
z_inj_surface	FloatList	Vertical coordinate at the centre of the injection surface [m]
phi_inj_surface	FloatList	Toroidal angle at the centre of the injection surface [rad]
tang_rad	FloatList	Tangency radius (major radius where the central line of a NBI unit is tangent to a circle around the symmetry axis)
angle	FloatList	Angle of inclination between a line at the centre of the injection unit surface and the horiontal plane
direction	integer	Direction of the beam seen from above the torus: -1 = clockwise; 1 = counter clockwise
div_vert	FloatList	Beam divergence for a unit in the vertical direction [rad]
div_horiz	FloatList	Beam divergence for a unit in the horizontal direction [rad]
focal_len_hz	FloatList	Horizontal focal length along the beam line [m]
n_beamlet	integer	Number of beamlets
r_beamlet	FloatList	Major radius coordinate at the beamlet centre [m]
z_beamlet	FloatList	Vertical coordinate at the beamlet centre [m]
phi_beamlet	FloatList	Toroidal coordinate at the beamlet centre [rad]
tangent_radius_beamlet	FloatList	Tangency radius of the beamlet [m]
angle_beamlet	FloatList	Angle of inclination between the beamlet and the horiontal plane [rad]
power_fraction_beamlet	FloatList	Power fraction beamlet

4.4.6.2 Locally defined types

Name	Type	Descriptions
FloatList	float	
int4geometrySelection	integer	Min(<=): 0

---

last update: 2019-01-31 by g2dpc

4.4.7 gray

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace:

4.4.7.1 Code parameter tree

Name	Type	Restrictions

Name	Type	Restrictions
/code_specific	--Directory--	
i_warm	integer	0=beamtr only, 1=weakly rel, 2=relativistic w/ asympt expansion, 3=rel w/ num integration
i_larm	integer	order of larmor expansion Min(<=): 1
i_eccd	integer	0=no, 1=yes ECCD calculation Min(<=): 0 Max(>=): 11
i_grad	integer	0=raytracing, 1=gaussian beam
n_rad_ray	integer	radial number of rays Min(<=): 1 Max(>=): 31
n_ang_ray	integer	angular numbers of rays Min(<=): 1 Max(>=): 36
rho_max	float	beam truncation (1=last ray at P=e^-2) Min(<): 0
ds	float	beamtracing step (cm) Min(<): 0
n_steps	integer	max number of beamtracing steps Min(<=): 1 Max(>=): 8000
/output_control	--Directory--	
i_rho	integer	0=dpsi, 1=drhop constant in EC profiles
n_proj_ec	integer	Number of points in EC profiles Min(<=): 1
i_step_proj	integer	beam shape data every i_step_proj points Min(<=): 1
i_step_ray	integer	ray data every i_step_ray points Min(<=): 1
/data_adjust	--Directory--	
i_x_pos	integer	-1=lower, 1=upper, 0=no X-point
psi_ne_bnd	float	density boundary (psi_norm) Min(<): 0
spline_psi	float	psi smoothing coefficient Min(<=): 0

last update: 2015-07-06 by tjohnson

4.4.8 Toray-FOM

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace:

4.4.8.1 Code parameter tree

Name	Type	Restrictions

Name	Type	Restrictions
/EDATA	--Directory--	
FMU	FloatList	
MODE	StringList	
POWER	FloatList	
X0	FloatList	
Y0	FloatList	
Z0	FloatList	
PHI0	FloatList	
DPHI	FloatList	
DX	FloatList	
THT0	FloatList	
DTHT	FloatList	
DY	FloatList	
NRAY	IntegerList	
NBEAM	integer	
NUMPHI	integer	
NTHETA	integer	
DGRID	float	
DS	float	
RELERR	float	
ABSERR	float	
SMAX	float	
XMAX	float	
YMAX	float	
ZMAX	float	
IDAMP	integer	
ACCUR	float	
MAXIT	integer	
NLRELA	boolean	
NMIN	integer	
NMAX	integer	
NTERM	integer	
NAM	integer	
NPM	integer	
NGM	integer	
NLCDRI	boolean	

Name	Type	Restrictions
MODELC	integer	
EZEFF	float	
NZONES	integer	
BOPHI	float	
RZERO	float	
RSHIFT	float	
ZSHIFT	float	
SEQUIB	string	
SWDENS	string	
SWTEMP	string	
AN	FloatList	
RO	FloatList	
WXO	FloatList	
WYO	FloatList	
NLMESH	boolean	
ANGRID	FloatList	
PARLAB	string	
IDISP	integer	
FDOUT	float	
NLPLAL	boolean	
NLPLOT	boolean	
NLTEXT	boolean	
DENE	FloatList	
TE	FloatList	
QFAC	FloatList	
RANE	FloatList	
RATE	FloatList	
RAQF	FloatList	
NNE	integer	
NTE	integer	
NQF	integer	
DMAX	float	
DMIN	float	
POWD1	float	
POWD2	float	
COFD3	float	

Name	Type	Restrictions
Q0	float	
QA	float	
TMAX	float	
TMIN	float	
POWT1	float	
POWT2	float	
COFT3	float	
RLIM	float	
ISHOT	integer	
TSLICE	float	
NLMIR	boolean	
PHIMIR	float	
DPHMIR	float	
THTMIR	float	
DTHMIR	float	
ANGRFL	float	
MODRFL	integer	
TPSI0	FloatList	
TDPSI	FloatList	
TNWIGL	FloatList	
TPHI0	FloatList	
MODTOR	IntegerList	
MODPOL	IntegerList	
NUMMOD	integer	
NLTURB	boolean	
NLRNDM	boolean	
RMODE	float	
WMODE	float	
MPOL	integer	
NTOR	integer	
PHASE0	float	
NISLAND	integer	
NLISL	boolean	

4.4.8.2 Locally defined types

Name	Type	Restrictions
StringList	string	

Name	Type	Restrictions
FloatList	float	
IntegerList	integer	

last update: 2014-12-19 by tjohnson

4.4.9 cyrano

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace:

4.4.9.1 Code parameter tree

Name	Type	Restrictions
/cyrano	--Directory--	
Npol	integer	Number of poloidal points
read_details	boolean	Testing equilibrium
total_power	float	Total RF Power [W]

last update: 2015-08-07 by dpc

4.4.10 lion

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace:

4.4.10.1 Code parameter tree

Name	Type	Restrictions
COCOS_IN	integer	Expected Cocos number in the input CPOs
COCOS_OUT	integer	Requested Cocos number for the output CPOs
ACHARG	FloatList	The charge of each ion species, given in atomic units. The length of this vector should be NRSPEC
AD	FloatList	Coefficient for polynomial density profile
AHEIGT	float	HEIGHT OF 2-D PLOTS
ALARG	float	WIDTH OF 2-D PLOTS
AMASS	FloatList	The mass of each ion species, given in atomic units. The length of this vector should be NRSPEC
AMASSE	float	ATOMIC MASS OF ELECTRON
ANGLET	FloatList	Toroidal cuts, in degrees.
ANTRAD	float	ANTRAD-1.=DISTANCE ANTENNA-PLASMA
ANTRADMAX	float	
ANTUP	float	UPPER RIGHT POSITION OF TOP/BOTTOM ANTENNA
ANU	float	COLLISIONAL DAMPING NU/OMEGA

Name	Type	Restrictions
ARSIZE	float	SIZE OF ARROWS
ASPCT	float	INVERSE ASPECT RATIO FOR SOLOVEV EQUILIBRIU
ASYMB	float	SIZE OF SYMBOLS
ATE	FloatList	
ATI	FloatList	
ATIP	FloatList	
BNOT	float	MAGNETIC FIELD AT MAGNETIC AXIS (TESLA)
CENO	FloatList	DENSITIES FOR CONST BETA SCAN OF DKE STAB
CENDEN	FloatList	DENSITIES OF ION SPECIES AT MAGN.AXIS (M-3)
CENTE	float	ELECTRON TEMPERATURE AT MAGNETIC AXIS
CENTI	FloatList	ION TEMPERATURES AT MAGN.AXIS (EV)
CENTIP	FloatList	PERP.ION TEMPERATURES AT MAGN. AXIS (EV)
CEOMCI	FloatList	NORMALIZED ION CYCLOTRON FREQUENCIES
CPSRF	float	PSI AT PLASMA SURFACE
CURASY	FloatList	AMPLITUDE OF SIN ANTENNA CURRENT (HELICAL)
CURSYM	FloatList	AMPLITUDE OF ANTENNA CURRENT
DELTA	float	PHENOMENOLOGICAL DAMPING
DELTAF	float	FREQUENCY INCREMENT FOR FREQUENCY TRACE
ELLIPT	float	ELLIPTICITY SQUARED FOR SOLOVEV EQUILIBRIUM
EPSMAC	float	ROUND-OFF ERROR OF COMPUTER
EQALFD	float	PROFILE PARAMETER OF TOTAL MASS DENSITY
EQDENS	float	PROFILE PARAMETER OF TOTAL MASS DENSITY
EQFAST	float	PROFILE PARAMETER OF FAST PARTICLE DENSITY
EQKAPD	float	PROFILE PARAMETER OF TOTAL MASS DENSITY
EQKAPF	FloatList	PROFILE PARAMETER OF FAST PARTICLE DENSITY
EQKAPT	FloatList	Parameter describing the ion temperature profile; TI(PARALLEL) = CENTI(I) * (1.-EQTI(I)*S*S) **EQKAPT(I)
EQKPTE	float	PROFILE PARAMETER OF ELECTRON TEMPERATURE
EQTE	float	PROFILE PARAMETER OF ELECTRON TEMPERATURE
EQTI	FloatList	Parameter describing the ion temperature profiles; TI(PARALLEL) = CENTI(I) * (1.-EQTI(I)*S*S) **EQKAPT(I)
FEEDUP	float	POSITION OF UPPER RIGHT FEED OF T/B ANTENNA
FRAC	FloatList	MASS FRACTION OF ION SPECIES
FRCEN	FloatList	CENTER OF ION DENSITY PROFILE
FRDEL	FloatList	WIDTH OF ION DENSITY PROFILE
FREQCY	float	FREQUENCY OF GENERATOR (HZ)
OMEGA	float	NORMALIZED FREQUENCY (*RMAJOR/ALFV.SPEED)

Name	Type	Restrictions
QIAXE	float	1./Q(AXIS) FOR SOLOVEV EQUILIBRIUM
RMAJOR	float	MAJOR RADIUS (M)
SAMIN	float	INSIDE EDGE OF ANTENNA INSIDE PLASMA (S)
SAMAX	float	OUTSIDE EDGE OF ANTENNA INSIDE PLASMA (S)
SIGMA	float	NORM FACTOR FOR V-THEMAL (IONS)
THANT	FloatList	THANT(J) are angles given in degrees, with values between 0 and 360. THANT(J) are measured from the magnetic axis horizontal.
THANTW	float	THETA OF SADDLE COILS TOROIDAL SECTIONS
TIME_ITM	FloatList	Time for slicing ITM CPO data (s).
VBIRTH	float	THE BIRTH VELOCITY OF FAST PARTICLES [M/S]
WALRAD	float	DISTANCE WALL-MAGNETIC AXIS IN UNITS OF THE MINOR RADIUS IN THE Z=0 PLANE.
WNTDEL	float	THE TOROIDAL WAVENUMBER INCREMENT FOR TOROIDAL WN SCANS
WNTORO	float	THE TOROIDAL WAVE NUMBER.
LENGTH	integer	Number of elements of a matrix block
MANCMP	integer	Number of poloidal wave numbers for helical antennas
MEQ	integer	Equilibrium quantities (i,jchi),js=1,npsi+1 ; EQ(i,jchi,js)
MFL	integer	Lower m value for fourier analysis
MPOLWN	IntegerList	Poloidal wave numbers for helical antenna
NANTSHEET	integer	Number of antenna current sheets. For NANTSHEET>1, the "power at antenna" might be wrong ... and hopefully the "power at plasma surface" is right. The current sheets are placed equidistantly between ANTRAD and ANTRADMAX. The current distribution as function of theta is identical for all sheets.

Name	Type	Restrictions
NANTYP	integer	The variable 'nantyp' selects the type of antenna. (A) NANTYP=-1: "Helical volume antenna". Volume antenna currents in the plasma between s=SAMIN and s=SAMAX, directed along psi=const surfaces, defined by: "j_a = grad psi x grad sigma", with sigma(s,chi,phi) = H(s-SAMIN) * H(SAMAX-s) * (sum[j=1..MANCMP] { CURSYM(j)*cos(MPOLWN(j)*chi) + CURASY(j)*sin(MPOLWN(j)*chi) }) * exp{i*WNTORO*phi}. Note that in this case there is no antenna in the vacuum region: the vacuum contribution to the right- hand side is put to zero by setting SAUTR(j) to zero. (B) NANTYP = 1 ==== "Helical antenna". current sheet at a constant distance of the plasma surface. The currents are harmonic functions of the poloidal angle theta, with poloidal wavenumbers given by 'MPOLWN(J)': SAUTR(THETA) = SUM(J=1 TO MANCMP) OF CURSYM(J)*COS(MPOLWN(J)*THETA) + I*CURASY(J)*SIN(MPOLWN(J)*THETA). There are no feeders. (C) NANTYP = 2 ==== LFS or HFS antenna. Specified by the input parameters THANT(J), J=1,4 and CURSYM(1). THANT(J) ARE ANGLES GIVEN IN DEGREES, WITH VALUES BETWEEN 0 AND 360. THANT(J) ARE MEASURED FROM THE MAGNETIC AXIS HORIZONTAL. THE LFS OR HFS ANTENNA IS A CURRENT SHEET WHICH, BETWEEN THETA = THANT(2) AND THANT(3), IS AT A CONSTANT DISTANCE OF THE PLASMA SURFACE AND CARRIES CONSTANT PURE POLOIDAL CURRENTS : SAUTR(THETA) = CURSYM(1) BETWEEN THETA = THANT(1) AND THETA = THANT(2) AND THETA = THANT(3) AND THETA = THANT(4) ARE THE FEEDERS, WHERE THE DISTANCE FROM THE PLASMA SURFACE INCREASES SMOOTHLY UP TO THE WALL SURFACE. THE LFS ANTENNA EXTENDS ACROSS THE THETA=0 LINE. THEREFORE THANT(3) < THANT(4) < THANT(1) < THANT(2). THE HFS ANTENNA CANNOT CROSS THE THETA=0 LINE. THEREFORE THANT(1) < THANT(2) < THANT(3) < THANT(4). THE SELECTION OF EITHER LFS OR HFS ANTENNA AUTOMATIC : THANT(3).LT.THANT(2) SELECTS LFS ANTENNA THANT(2).GT.THANT(3) SELECTS HFS ANTENNA NOTE THAT WE MUST HAVE THANT(1) < THANT(2) AND THANT(3) < THANT(4). (D) NANTYP = 3 ==== TOP/BOTTOM ANTENNA. THE ANTENNA SURFACE IS UP/ DOWN SYMMETRIC, AT CONSTANT DISTANCE OF THE PLASMA SURFACE BETWEEN THETA = ANTUP AND THETA = PI - ANTUP. THE CURRENTS ARE DEFINED AS FOR NANTYP = 1. (E) NANTYP = 4 ==== SADDLE COIL ANTENNA. THE ANTENNA SURFACE IS THE SAME AS FOR THE HELICAL ANTENNA: CURRENT SHEET AT A DISTANCE ANTRAD-1 OF THE PLASMA SURFACE. THE CURRENT = CURSYM(1) IN [THANT(1),THANT(2)] AND IN [THANT(3),THANT(4)], SMOOTHLY DECAYING TO ZERO NEAR THANT(J).
NANT_ITM	integer	0 (default), 1 if uses antennas_in and antennas_tools to define the antenna geometry
NBCASE	integer	Number of cases for the constant beta scan
NBTYPE	integer	TYPE OF CONSTANT BETA SCAN: 1 == n_i(o) IS VARIED (CEN0()), T_i(o) and T_e(o) as 1/n_i(o), Bo is kept constant. ==> v_A(o) is varied 2 == n_i(o) IS VARIED (CEN0()), Bo as sqrt(n_i(o)), ==> v_A(o) constant T_i(o) and T_e(o) are kept constant 'NLTTMP': .F. ==> SWITCH OFF TTMP BY PUTTING B_PARALLEL TO 0 IN DKE POWER EXPRESSIONS.
NCHI	integer	Number of poloidal intervals all around (please note that in LION this becomes variable NPOL, and that NCHI is defined in lion as the number of poloidal intervals in the upper half-plane)
NCOLMN	integer	Rank of a matrix block
NCONTR	integer	Number of contour lines
NCUT	integer	Number of toroidal cuts for plots
NDA	integer	Matrix a I/O channel
NDARG	integer	Argument for polynomial density profile

Name	Type	Restrictions
NDDEG	integer	Degree of polynomial density profile
NDENS	integer	Selects type of density profile
NDES	integer	R,Z coordinates and normals i/o channel
NDLT	integer	Decomposed matrix L,D,U I/O channel
NDS	integer	Solution vector
NELDTTMP	integer	Type of model for Electron Landau and TTMP damping 1 ==> Additional damping term in epsilon_{perp,perp}, with k_perp from Fast Wave dispersion relation; see WEPSEL in subroutine QUAEQU 2 ==> Additional damping term propto B_parallel, consistent in the weak variational form; see WEPSTTMP in subroutine QUAEQU, CONST1,2,3, etc. Factor 1/2 for combined ELD and TTMP of fast waves
NELDTTMPCOR	integer	Correction (perturbative) to electron Landau and TTMP damping diagnostics 0 (default): do not correct 1 : do the correction; option valid only for NELDTTMP=1; WARNING: the powers will not be consistent
NFAKAP	integer	Number of fast particle density profiles
NHARM	integer	Maximum absolute value of the harmonic number used in constructing the warm plasma dielectric tensor, i.e. the tensor includes components for harmonic numbers from -NHARM to +NHARM.
NPLTYP	integer	2-D GRAPHICAL PLOTS SELECTED IN NLPL05(4): - IF NPLTYP = 1 (DEFAULT): PREPARES PLOT FILES FOR USE WITH THE GRAPHICAL PACKAGE BASPL: WRITES A FILE coords (TAPE18) OF (R,Z) COORDINATES OF MESH CELLS CENTERS AND A FILE fields (TAPE19) OF (R,Z) COMPONENTS OF E, POWER ABSORPTION DENSITY, NORMAL AND BINORMAL COMPONENTS OF E, NORMAL, BINORMAL AND PARALLEL COMPONEMTS OF B. THE PLOTS ARE THEN DONE WITH THE GRAPHICAL PACKAGE BASPL. IT ALLOWS TO MAKE COLOR PLOTS, ARROW PLOTS, CONTOUR PLOTS, ... INTERACTIVELY. - IF NPLTYP = 2 : PLOT FILE FOR USE WITH THE GRAPHICAL PACKAGE explorer: WRITES A FILE corfields (TAPE19) CONTAINING COORDINATES AND FIELDS.
NPOL	integer	Total number of chi intervals
NPRNT	integer	Line-printer output
NPSI	integer	Number of s intervals
NREAD	integer	-documentation missing-
NRSPEC	integer	Number of ion species
NRUN	integer	The number of runs for frequency traces
NSADDL	integer	SELECTS THE TYPE OF SADDLE COIL PHASING IN THE POLOIDAL PLANE. THIS IS DISCARDED UNLESS NANTYP = 4. NSADDL = 0 === ONLY 1 SADDLE COIL ANTENNA IS CONNECTED: BETWEEN THANT(1) AND THANT(2). NSADDL = 1 === 2 SADDLE COILS ARE CONNECTED. THE CONNECTION IS DONE IN OPPOSITE DIRECTIONS FOR THE 2 COILS, THUS DEFINING A PREDOMINANTLY 'M=1' ANTENNA CURRENT COMPONENT: (+-) PHASING. NSADDL = 2 === 2 SADDLE COILS ARE CONNECTED. THE CONNECTION IS DONE IN THE SAME DIRECTION FOR THE 2 COILS, THUS DEFINING A PREDOMINANTLY 'M=2' ANTENNA CURRENT COMPONENT: (++) PHASING. THIS IS THE DEFAULT VALUE.
NSAVE	integer	NAMELIST I/O CHANNEL
NSOURC	integer	NAMELIST I/O CHANNEL

Name	Type	Restrictions
NTEMP	integer	'EQTI()', EQKAPT()', 'NTEMP': SPECIFY THE ION PARALLEL AND PERPENDICULAR TEMPERATURE PROFILES [EV] : NTEMP = -2 ==> PROPORTIONAL TO SQRT(EQUILIBRIUM_PRESSURE) TI(PARALLEL) = CENTI(I) * SQRT (P/P_AXIS) NTEMP = -1 ==> POLYNOMIAL FUNCTION OF S**2 IF NDARG = 1 S IF NDARG = 2 TE/TI()/TIP() = CENTE/CENTI()/CENTIP() * (1. + SUM(J=1,NDDEG) {ATE/ATI/ATIP(J)*ARG**J}) NTEMP # -1 OR -2 ==> TI(PARALLEL) = CENTI(I) * (1.-EQTI(I)*S*S) **EQKAPT(I) (SUBROUTINE TEMPI) NTEMP = -2 ==> PROPORTIONAL TO SQRT(EQUILIBRIUM_PRESSURE) TI(PERP) = CENTIP(I) * SQRT (P/P_AXIS) NTEMP=-1 ==> POLYNOMIAL (SEE ABOVE) NTEMP # -2 ==> TI(PERP) = CENTIP(I) * (1.-EQTI(I)*S*S) **EQKAPT(I) (SUBROUTINE TEMPRP)
NTORSP	integer	The number of toroidal WN's for toroidal WN scans
NUMBER	integer	Run number
NVERBOSE	integer	Select verbosity of output to STDOUT
NVAC	integer	VACUUM QUANTITIES I/O CHANNEL
NLCOLD	boolean	Switch off electron Landau and TTMP damping of fast wave: If .TRUE. then no additionnal term in EPSILON_PERPPERP If .FALSE. then additionnal damping term in EPSILON_PERPPERP. Note that the alfven wave electron landau damping rate is evaluated as a diagnostic of the obtained solution irrespectively of the value of NLCOLE.
NLCOLE	boolean	Switch off electron Landau and TTMP damping of fast wave. If .TRUE. then no additionnal term in EPSILON_PERPPERP If .FALSE. then additionnal damping term in EPSILON_PERPPERP. Note that the alfven wave electron landau damping rate is evaluated as a diagnostic of the obtained solution irrespectively of the value of NLCOLE.
NLDIP	boolean	Selects monopole or dipole antenna. the dipole option has not been programmed yet. DEFAULT: FALSE , i.e. monopole.
NLDISO	boolean	Switch computation and diagnostics of the solution. If NLDISO=.TRUE. then the solution is computed everywhere. Diagnostics are performed, printed and/or plotted according to NLOTP5() and NLPLO5() (see below). With this option (which is the default) running the LION code requires scratch disk space for matrix storage: 96 * NPSI * NPOL**2 (bytes) If NLDISO=.FALSE. then the solution is computed only at the plasma-vacuum interface. The only diagnostic is the total power, which is permanent output. It is correct as long as there is no source inside the plasma. No other diagnostics are perfomed, irrespectively of NLOTP5() and NLPLO5(). With this option the lion code does not use disk space for matrix storage, therefore the turnaround time is reduced.
NLPHAS	boolean	Switch poloidal phase extraction
NLFAST	boolean	If TRUE, then introduce fast particles
NLOTP0	boolean	General switch for line-printer output and graphics
NLOTP1	BooleanList	LINE-PRINTER OUTPUT FOR EQUILIBRIUM QUANTITIES (LION1); LENGTH 5.
NLOTP2	BooleanList	LINE-PRINTER OUTPUT FOR VACUUM QUANTITIES (LION2). (1) : GEOMETRICAL QUANTITIES AT PLASMA SURFACE. (2) : POSITIONS OF PLASMA SURFACE, ANTENNA AND WALL. (3) : ANTENNA CURRENT POTENTIAL VS CHI AND THETA. (4) : NON-HERMICITY OF VACUUM MATRIX. (5) :
NLOTP3	BooleanList	LINE-PRINTER OUTPUT FOR MATRIX CONSTRUCTION (LION3). LENGTH 2.
NLOTP4	BooleanList	LINE-PRINTER OUTPUT FOR MATRIX SOLVER (LION4). (1) : NAMELIST (2) : OHM-VECTOR (3) : SOLUTION AT PLASMA BOUNDARY (4) : (5) :

Name	Type	Restrictions
NLOTP5	BooleanList	LINE-PRINTER OUTPUT FOR SOLUTION DIAGNOSTICS (LION5). (1) : NAMELIST (2) : RADIAL POWER ABSORPTIONS AND OTHER DIAGNOSTICS (3) : EXTENDED OUTPUT OF RADIAL DIAGNOSTICS (4) : 2-D POWER ABSORPTION DENSITY (5) : 2-D POWER ABSORBED IN EACH CELL (6) : 2-D NORMAL COMPONENT OF POYNTING (7) : 2-D PERP COMPONENT OF POYNTING (8) : 2-D PARALLEL COMPONENT OF POYNTING (9) : (10) : 2-D REAL PART OF E-NORMAL (11) : 2-D REAL PART OF E-PERP (12) : 2-D IMAGINARY PART OF E-NORMAL (13) : 2-D IMAGINARY PART OF E-PERP (14) : 2-D POLARAZATION NORM OF E-PLUS SQUARED (15) : 2-D POLARIZATION NORM OF E-MINUS SQUARED (16) : ELECTRIC FIELD ON OUTER EQUATORIAL PLANE (CHI=0) (17) : (18) : POLOIDAL FOURIER COMPONENTS OF E-NORMAL IN THETA FOR M = 'MFL', MFL+1, .., MFU(=MFL+MD2FP1-1) (19) : POLOIDAL FOURIER COMPONENTS OF E-PERP IN THETA (20) : POLOIDAL FOURIER COMPONENTS OF E-NORMAL IN CHI (21) : POLOIDAL FOURIER COMPONENTS OF E-PERP IN CHI (22) : 2-D EPSILON SUB-N-N - N**2 / R**2 (23) : 2-D IMAGINARY PART OF EPSILON SUB N-N (24) : 2-D OMEGA - OMEGACI (25) : SHEAR ALFVEN FREQUENCIES (NEGLECTING TOROIDAL COUPLING; FOR SINGLE SPECIES PLASMA ONLY), FOR M = 'MFL', MFL+1, .., MFU(=MFL+MD2FP1-1) (26) : DENSITY, MINOR AND MAJOR RADIUS, IN NORMALISED AND S.I. UNITS, ON THE OUTER EQUATORIAL PLANE (CHI=0). (31) : POLOIDAL FOURIER COMPONENTS OF B_N IN THETA FOR M = 'MFL', MFL+1, .., MFU(=MFL+MD2FP1-1) (32) : POLOIDAL FOURIER COMPONENTS OF B_B IN THETA (33) : POLOIDAL FOURIER COMPONENTS OF B_PAR IN THETA (34) : POLOIDAL FOURIER COMPONENTS OF B_N IN CHI (35) : POLOIDAL FOURIER COMPONENTS OF B_B IN CHI (36) : POLOIDAL FOURIER COMPONENTS OF B_PAR IN CHI THE 2-D TABLES GIVE THE VALUES ON THE CENTERS OF THE CELLS OF THE (S,CHI) MESH. A LINE IN THE TABLE CORRESPONDS TO A PSI = CONST SURFACE. IT GOES FROM CHI=0 TO CHI=PI IN THE UPPER HALF-PLANE AND FROM CHI=PI TO CHI=2*PI IN THE LOWER HALF-PLANE. THE VALUES ARE NORMALIZED TO THEIR MAXIMUM VALUE. THE FIRST AND THE LAST LINES OF THE TABLES GIVE THE POLOIDAL NUMBERING OF THE CELLS. THE FIRST COLUMN GIVES THE RADIAL NUMBERING OF THE CELLS. ALL OUTPUT IS IN CODE-NORMALIZED UNITS UNLESS SPECIFIED.
NLPLO5	BooleanList	GRAPHICAL OUTPUT FOR LION5 (1) : GENERAL SWITCH FOR GRAPHICAL PLOTS (2) : RADIAL POWER ABSORPTION AND FLUX (3) : FAST ION BETA_CRITICAL AND P_DK(S). WRITES TABLES ON TAPE26 AND TAPE27 => MATLAB (plotfast.m AND plotpdks(.,.).m) (4) : 2-D GRAPHICAL PLOTS : - IF NPLTYP = 1 (DEFAULT): PREPARES PLOT FILES FOR USE WITH THE GRAPHICAL PACKAGE BASPL: WRITES A FILE coords (TAPE18) OF (R,Z) COORDINATES OF MESH CELLS CENTERS AND A FILE fields (TAPE19) OF (R,Z) COMPONENTS OF E, POWER ABSORPTION DENSITY, NORMAL AND BINORMAL COMPONENTS OF E, NORMAL, BINORMAL AND PARALLEL COMPONEMTS OF B. THE PLOTS ARE THEN DONE WITH THE GRAPHICAL PACKAGE BASPL. IT ALLOWS TO MAKE COLOR PLOTS, ARROW PLOTS, CONTOUR PLOTS, ... INTERACTIVELY. - IF NPLTYP = 2 : PLOT FILE FOR USE WITH THE GRAPHICAL PACKAGE explorer: WRITES A FILE corfields (TAPE19) CONTAINING COORDINATES AND FIELDS. (5) : POLOIDAL FOURIER COMPONENTS (CABS) OF E_n, E_b, B_n, B_b AND B_//. WRITES A TABLE ON TAPE25 => => MATLAB (plotfour.m).
NLTTMP	boolean	Switch on/off TTMP by putting B_parallel to 0 in DKE power expressions.
NITMOPT	integer	Uses ITM database: 0 (default) = no, 1 =reads from ITM, 10=writes on ITM, 11=reads and writes, 22=LION run as module within Kepler
NITMRUN	IntegerList	ITM run number
NITMSHOT	IntegerList	ITM shot number

4.4.10.2 Locally defined types

Name	Type	Descriptions
IntegerList	integer	
FloatList	float	
BooleanList	boolean	

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last update: 2015-08-07 by dpc

4.4.11 icdep

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: ICRF wave absorption parameters for the waves-cpo generating code icdep

Namespace:

4.4.11.1 Code parameter tree

Name	Type	Restrictions
/absorption_geometry	--Directory--	Geometric parameters describing the absorption profiles
width_rho	float	Width of the absorption in rho_tor_norm
width_r	float	Width of the absorption in R [m]
width_z	float	Width of the absorption in Z [m]
/power_partition	--Directory--	Partition of the launched power absorbed on the different species
fract_eld_ttmp	float	Fraction of the power absorbed through Electron Landau Damping and Transit Time Magnetic Pumping
fract_coll2electrons	float	Fraction of the fast ion absorbed power that is transferred to the electrons
/wave_quantities	--Directory--	Properties of the wave field
n_phi	integer	Toroidal mode number
k_theta	float	Wave vector component in the poloidal (theta) direction [1/m]
k_rho	float	Wave vector component in the radial (rho) direction [1/m]
ratio_Eplus_Eminus	float	Ratio of the magnitude between E_plus and E_minus, i.e. the left and right hand polarised components
phase_Eplus_Eminus	float	Complex phase difference between E_plus and E_minus = log(E_plus / E_minus) [rad]

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last update: 2012-03-28 by tjohnson

4.4.12 nuclearsim

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for Nuclearsim (nuclear reaction rates for thermal plasmas)

Namespace:

4.4.12.1 Code parameter tree

Name	Type	Restrictions
/select_output_species	--Directory--	
source_from_neutrons	boolean	If true, then the source rate of fusion/fission produced neutrons will be calculated
source_from_H	boolean	If true, then the source rate of fusion/fission produced protons will be calculated
source_from_D	boolean	If true, then the source rate of fusion/fission produced deutrons will be calculated
source_from_T	boolean	If true, then the source rate of fusion/fission produced tritons will be calculated
source_from_He3	boolean	If true, then the source rate of fusion/fission produced Helium-3 will be calculated
source_from_He4	boolean	If true, then the source rate of fusion/fission produced Helium-4 will be calculated
/output	--Directory--	Defining the formatting of the output distsource CPO
/output/markers	--Directory--	Defining the formatting of the output distsource markers
n_toroidal	integer	Number of grid point in the toroidal angle; used only if Markers are initialised on a grid.
n_angle1	integer	Number of grid point in the assimuthal angle of the spherical velocity space coordinate system (not field aligned); used only if Markers are initialised on a grid.
n_angle2	integer	Number of grid point in the non-assimuthal angle of the spherical velocity space coordinate system (not field aligned); used only if Markers are initialised on a grid.
n_skip_r	integer	Define the R-grid from equilibrium%profiles_2d%r(n_skip_r:n_skip_r:end) grid; used only if Markers are initialised on a grid.
n_skip_z	integer	Define the z-grid from equilibrium%profiles_2d%z(n_skip_z:n_skip_z:end) grid; used only if Markers are initialised on a grid.
initalisation_scheme	initalisation_scheme_domain	1: Initialise on a grid.
verbosity	integer	Specifies the verbosity of the output to stdout and stderr.

4.4.12.2 Locally defined types

Name	Type	Descriptions
initalisation_scheme_domain	integer	Min(<=): 1

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last update: 2014-12-19 by tjohnson

4.4.13 nemo

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for Nemo (neutral beam deposition code)

Namespace:

4.4.13.1 Code parameter tree

Name	Type	Restrictions
/select_output_resolution	--Directory--	
n_out_profiles	integer_minInclusive_2	Resolution of the output 1D profiles
n_pitch_resol	integer_minInclusive_2	Resolution of the output pitch angle profile
n_output_2d_r	integer_minInclusive_2	R-resolution of the output (R,Z) 2D profiles
n_output_2d_z	integer_minInclusive_2	Z-resolution of the output (R,Z) 2D profiles
n_output_2d_f	integer_minInclusive_1	PHI-resolution of the output (R,Z,PHI) profiles
debug_mode	integer_minmaxInclusive_01	Flag for debug mode (0 = normal execution, 1 = debug mode)

4.4.13.2 Locally defined types

Name	Type	Descriptions
integer_minInclusive_1	integer	Min(<=): 1
integer_minInclusive_2	integer	Min(<=): 2
integer_minmaxInclusive_01	integer	Min(<=): 0 Max(>=): 1

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last update: 2015-08-07 by dpc

4.4.14 StixReDist

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Namespace:

4.4.14.1 Code parameter tree

Name	Type	Restrictions
/stix_redist	--Directory--	
max_iterations	integer	Maximum number of iterations per magnetic surface
tolerance_Teff	float	Tolerance on Teff evolution to stop the iterative scheme
N_velocity_grid	integer	Number of points in velocity grid
target_ions	integer	Switch to choose between iterating on all ion species(=0) or on a single one(=ion_index)
use_internal_power	boolean	Switch for computing RF power absorption internally(=1) or importing it from CPOs(=0)
total_power	float	Total RF Power [W] (only used when use_internal_power=1)

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last update: 2014-12-19 by tjohnson

4.4.15 nbisim

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for hcd2coresource

Namespace:

4.4.15.1 Code parameter tree

Name	Type	Restrictions
verbosity	nonNegativeInteger	Regulates the amount of standard output. 1 - only error messages and warnings; 2 - idenitify start and end of code; 3 - Main results; 4 - Detailed logging.

4.4.15.2 Locally defined types

Name	Type	Descriptions
positiveInteger	integer	Min(<=): 1
nonNegativeInteger	integer	Min(<=): 0

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last update: 2015-08-07 by dpc

4.4.16 risk

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for Risk (Fokker-Planck code)

Namespace:

4.4.16.1 Code parameter tree

Name	Type	Restrictions
n_out_profiles	integer_minInclusive_2	Resolution of the output 1D profiles
dx_resolution	float_minInclusive_dot0001	Normalized velocity resolution (v/vth)
fac_implicit	float_minInclusive_dot1	Implicit/explicit contribution for integration scheme (Crank-Nicholson or so)
debug_mode	integer_minmaxInclusive_01	Flag for debug mode (0 = normal execution, 1 = debug mode)

4.4.16.2 Locally defined types

Name	Type	Descriptions
integer_minInclusive_2	integer	Min(<=): 2
integer_minmaxInclusive_01	integer	Min(<=): 0 Max(>=): 1
float_minInclusive_dot0001	float	Min(<=): 0.0001
float_minInclusive_dot1	float	Min(<=): 0.1

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last update: 2015-08-07 by dpc

4.4.17 rfof

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: RFOF code parameters

Namespace:

4.4.17.1 Code parameter tree

Name	Type	Restrictions
/rfof_parameters	--Directory--	RFOF code parameters
/rfof_parameters/rfof_core_param	--Directory--	Contains all fields needed when coupling to RFOF
/rfof_parameters/rfof_core_param/assumptions	--Directory--	List of optional physics assumptions.
assume_static_resonance_position_during_RF_kick	boolean	If true then the RF intraction induces no spatial motion of the orbit during the wave-particle interaction (however the new drift orbit may have a different spatial extent)
use_drift_velocity_in_doppler_shift	boolean	If true then the Doppler shift due to the drift velocity is included in the resonance condition
use_parallel_velocity_in_doppler_shift	boolean	If true then the Doppler shift due to the parallel velocity is included in the resonance condition
assume_zero_larmor_radius_in_KPERPxRHO	boolean	If "true", then the finite larmor radius effects in the wave particle interaction are neglected
assume_kpar_is_nphi_over_R	boolean	If "true" then the parallel wave number of is nphi/R, otherwise the exact value is used
assume_zero_order_FLR_for_Pphi	boolean	Neglect finite larmor radius (FLR) corrections to P_phi
width_of_rf_resonance_layer	float	Width of the resonance layer as a fraction of the momentary major radius
/rfof_parameters/rfof_core_param/bounding_box	--Directory--	Bounding box in the poloidal cross section.
Rmin	float	Minimum major radius of the bounding box [m]
Rmax	float	Maximum major radius of the bounding box [m]
Zmin	float	Minimum vertical coordinate of the bounding box [m]
Zmax	float	Maximum vertical coordinate of the bounding box [m]
/rfof_parameters/rfof_core_param/resonance_memory	--Directory--	
nStoreTimes	integer	The number of time points to be stored in the resonance memory. These are used to extrapolate the orbit to the next upcoming resonance.
/rfof_parameters/rfof_core_param/IO_control	--Directory--	Controlling the output written to file
start_time_event_output	float	Time at which to start generating event-output files
output__2D_RZ_out	boolean	If true, then 2D output in (R,Z) will be generated for the density of abosorbed power and torque
NRedges_2DgridRZ	integer	Number of horizontal grid points in the 2D (R,z) grid
NZedges_2DgridRZ	integer	Number of vertical grid points in the 2D (R,z) grid

Name	Type	Restrictions
output__Orbit	boolean	If true, then output of the full orbits wil be generated and stored to file
MAX_number_of_points_stored_in_the_Orbit	integer	Maximum number of orbit points written to file
output__rf_kicks	boolean	If true, then a list of rf-kicks will be generated containing the location and strength of the kick
MAX_number_of_points_stored_in_rf_kick	integer	Maximum number of rf-kick points written to file
output__resonace_predictions	boolean	If true, then a list of rf-resonance preditions will be generated containing the present location and predicted location of the next resonance
MAX_number_of_points_stored_in_resonance_memory	integer	Maximum number of rf-resonance prediction points written to file
output__efield_normalization	boolean	If true, then a list of electric field normalization factors to file
MAX_number_of_points_stored_in_the_efield_normalization	integer	Maximum number of electric field normalizations (time-vector) written to output file
/rfof_parameters/rfof_core_param/quasilinear	--Directory--	Parameters describing the quasilinear model
MAX_relative_energy_kick	float	The I-perp kicks cannot be larger than this fraction of the input I-perp
/rfof_parameters/rfof_plasma_param	--Directory--	
/rfof_parameters/rfof_plasma_param/composition	--Directory--	
n_species	integer	Number of plasma ion species
amn	RFOF_FloatList	Atomic mass number
zn	RFOF_FloatList	Nuclear charge in atomic units
zion	RFOF_FloatList	Ionic charge in atomic units
/rfof_parameters/rfof_wave_param	--Directory--	
select_wave_from	integer	Select where the wave field should be taken from. 0 : wave generated from the data in parametric_wave 1 : wave read from ascii version of ITM cpos, written using write_cpo in the write_structures module. Filename is specified in ascii_itm_wave/filename_ascii_itm_wave.
/rfof_parameters/rfof_wave_param/parametric_wave	--Directory--	
nfreq	integer	Number of RF frequencies
nnphi	integer	Number of toroidal modes per frequency
RFpower	RFOF_FloatList	Power provided by the RF wave field
EfieldNormalisation	RFOF_FloatList	Normalisation factor for the strength of the RF wave field
ratioEPlusOverEMinus	RFOF_FloatList	Ratio between the left- and right-hand polarized electric wave field components
freq	RFOF_FloatList	RF wave frequency [Hz]
nphi	RFOF_IntegerList	Toroidal mode number
kperp	RFOF_FloatList	Perpendicular wave number [1/m]

Name	Type	Restrictions
verticalCentre	RFOF_FloatList	Vertical centre of the Gaussian RF wave field [m]
verticalWidth	RFOF_FloatList	Vertical width of the Gaussian RF wave field [m]
filename_lion_fields	string	Filename for lion corfields-file
/rfof_parameters/rfof_wave_param/ascii_itm_wave	--Directory--	
filename_ascii_itm_wave	string	Name of input file containing the ITM cpo waves in ascii format written using write_cpo in the write_structures module
/rfof_parameters/rfof_wrapper_param	--Directory--	
/rfof_parameters/rfof_wrapper_param/time_stepping	--Directory--	
NtimeSteps	nonNegativeInteger	Number of time steps (of standalone RFOF orbit tracer).
dt	RFOF_FloatPositive	Length of each time step [s].
nStoreOutTimes	integer	Number of time steps between which the output is accumulated before being written to file.
/rfof_parameters/rfof_wrapper_param/magnetic_field	--Directory--	
R0	float	Major radius of the plasma torus [m].
aminor	float	Minor radius of the plasma torus [m].
B0	float	Magnetic field strength att the magnetic axis [T].
q	float	Safety factor of the magnetic field.
/rfof_parameters/rfof_wrapper_param/markers	--Directory--	Defining the initial conditions for the markers in the RFOF wrapper
species_index	integer	Species index within the vector of particle species in the rfof_plasma_param/composition/*(), where * is amn, zn and zion. species_index has be in the range [1,rfof_plasma_param/composition/n_species]
weight	float	Marker weight
R	float	Initial major radius position of the marker [m]
z	float	Initial veritical position of the marker [m]
phi	float	Initial toroidal angle of the marker [rad]
charge	float	Charge of the marker [au]
mass	float	Mass of the marker [au]
E	float	Energy of the marker [eV]
xi	float	Pitch-angle of the marker [-]

4.4.17.2 Locally defined types

Name	Type	Descriptions
RFOF_FloatPositive	float	Min(<): 0.0

Name	Type	Descriptions
RFOF_FloatList	float	
RFOF_IntegerList	integer	

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last update: 2014-12-19 by tjohnson

4.4.18 spot

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for Spot (Fokker-Planck code)

Namespace:

4.4.18.1 Code parameter tree

Name	Type	Restrictions
nperstep	integer_minInclusive_1	Number of markers to be created every big time step
nout1d	integer_minInclusive_2	Resolution of output 1D-profiles
nout2dr	integer_minInclusive_2	R Resolution of output 2D-profiles
nout2dz	integer_minInclusive_2	Z Resolution of output 2D-profiles
ksolver	integer_minmaxInclusive_12	Flag for internal solver: 1 = (R,Z) coordinates, 2 = (PSI,THETA) Boozer coordinates
bigwidth	float_minmaxInclusive_dot0001_dot01	Duration of a big time step (sec) for source update, RFOF E-field normalisation, etc
icrh_heating	integer_minmaxInclusive_01	Flag for ICRH heating (0 = NO, 1 = YES)
debug_mode	integer_minmaxInclusive_01	Flag for debug mode (0 = normal execution, 1 = debug mode)
source_flag	integer_minmaxInclusive_14	Flag for source option (0=Spot-generated-alphas, 2=Spot-generated-thermals-for-ICRH, 3=Spot-generated-NBI, 4=marker-source)
icrh_ion_mass	float_minmaxInclusive_mendeleiv	Mass of followed ICRH-accelerated ion (if any)
icrh_ion_charge	float_minmaxInclusive_mendeleiv	Charge of followed ICRH-accelerated ion (if any)
kforce_xml	integer_minmaxInclusive_01	Flag to force the use of XML input file for ICRF heating (when = 1)

4.4.18.2 Locally defined types

Name	Type	Descriptions
integer_minInclusive_1	integer	Min(<=): 1
integer_minInclusive_2	integer	Min(<=): 2
integer_minmaxInclusive_12	integer	Min(<=): 1 Max(>=): 2
integer_minmaxInclusive_14	integer	Min(<=): 1 Max(>=): 4
integer_minmaxInclusive_01	integer	Min(<=): 0 Max(>=): 1
float_minmaxInclusive_dot0001_dot01	float	Min(<=): 1.e-4 Max(>=): 0.1
float_minmaxInclusive_mendeleiv	float	Min(<=): 1.0 Max(>=): 300.0

4.4.19 spot_rfof

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for Spot (Fokker-Planck code)

Namespace:

4.4.19.1 Code parameter tree

Name	Type	Restrictions
nperstep	integer_minInclusive1	Number of markers to be created every big time step
nout1d	integer_minInclusive2	Resolution of output 1D-profiles
nout2dr	integer_minInclusive2	R Resolution of output 2D-profiles
nout2dz	integer_minInclusive2	Z Resolution of output 2D-profiles
ksolver	integer_minmaxInclusive	Flag for internal solver: 1 = (R,Z) coordinates, 2 = (PSI,THETA) Boozer coordinates
bigwidth	float_minmaxInclusive	Duration of big time step (sec) for source update, RFOF E-field normalisation, etc
icrh_heating	integer_minmaxInclusive	Flag for ICRH heating (0 = NO, 1 = YES)
debug_mode	integer_minmaxInclusive	Flag for debug mode (0 = normal execution, 1 = debug mode)
source_flag	integer_minmaxInclusive	Flag for source option (0=Spot-generated-alphas, 2=Spot-generated-thermals-for-ICRH, 3=Spot-generated-NBI, 4=marker-source)
icrh_ion_mass	float_minmaxInclusive	Mass of followed ICRH-accelerated ion (if any)
icrh_ion_charge	float_minmaxInclusive	Charge of followed ICRH-accelerated ion (if any)
kforce_xml	integer_minmaxInclusive	Flag to force the use of XML input file for ICRF heating (when = 1)
/rfof_parameters	--Directory--	RFOF code parameters
/rfof_parameters/rfof_core_param	--Directory--	Contains all fields needed when coupling to RFOF
/rfof_parameters/rfof_core_param/assumptions	--Directory--	List of optional physics assumptions.
assume_static_resonance_position_during_RF_kick	boolean	If true then the RF intraction induces no spatial motion of the orbit during the wave-particle interaction (however the new drift orbit may have a different spatial extent)
use_drift_velocity_in_doppler_shift	boolean	If true then the Doppler shift due to the drift velocity is included in the resonance condition
use_parallel_velocity_in_doppler_shift	boolean	If true then the Doppler shift due to the parallel velocity is included in the resonance condition
assume_zero_larmor_radius_in_KPERPxRHO	boolean	If "true", then the finite larmor radius effects in the wave particle interaction are neglected
assume_kpar_is_nphi_over_R	boolean	If "true" then the parallel wave number of is nphi/R, otherwise the exact value is used
assume_zero_order_FLR_for_Pphi	boolean	Neglect finite larmor radius (FLR) corrections to P_phi
width_of_rf_resonance_layer	float	Width of the resonance layer as a fraction of the momentary major radius

Name	Type	Restrictions
/rfof_parameters/rfof_core_param/bounding_box	--Directory--	Bounding box in the poloidal cross section.
Rmin	float	Minimum major radius of the bounding box [m]
Rmax	float	Maximum major radius of the bounding box [m]
Zmin	float	Minimum vertical coordinate of the bounding box [m]
Zmax	float	Maximum vertical coordinate of the bounding box [m]
/rfof_parameters/rfof_core_param/resonance_memory	--Directory--	
nStoreTimes	integer	The number of time points to be stored in the resonance memory. These are used to extrapolate the orbit to the next upcoming resonance.
/rfof_parameters/rfof_core_param/IO_control	--Directory--	Controlling the output written to file
start_time_event_output	float	Time at which to start generating event-output files
output__2D_RZ_out	boolean	If true, then 2D output in (R,Z) will be generated for the density of abosorbed power and torque
NRedges_2DgridRZ	integer	Number of horizontal grid points in the 2D (R,z) grid
NZedges_2DgridRZ	integer	Number of vertical grid points in the 2D (R,z) grid
output__Orbit	boolean	If true, then output of the full orbits wil be generated and stored to file
MAX_number_of_points_stored_in_the_Orbit	integer	Maximum number of orbit points written to file
output__rf_kicks	boolean	If true, then a list of rf-kicks will be generated containing the location and strength of the kick
MAX_number_of_points_stored_in_rf_kick	integer	Maximum number of rf-kick points written to file
output__resonace_predictions	boolean	If true, then a list of rf-resonance preditions will be generated containing the present location and predicted location of the next resonance
MAX_number_of_points_stored_in_resonance_memory	integer	Maximum number of rf-resonance prediction points written to file
output__efield_normalization	boolean	If true, then a list of electric field normalization factors to file
MAX_number_of_points_stored_in_the_efield_normalization	integer	Maximum number of electric field normalizations (time-vector) written to output file
/rfof_parameters/rfof_core_param/quasilinear	--Directory--	Parameters describing the quasilinear model
MAX_relative_energy_kick	float	The I-perp kicks cannot be larger than this fraction of the input I-perp
/rfof_parameters/rfof_plasma_param	--Directory--	
/rfof_parameters/rfof_plasma_param/composition	--Directory--	
n_species	integer	Number of plasma ion species
amn	RFOF_FloatList	Atomic mass number
zn	RFOF_FloatList	Nuclear charge in atomic units

Name	Type	Restrictions
zion	RFOF_FloatList	Ionic charge in atomic units
/rfof_parameters/rfof_wave_param	--Directory--	
select_wave_from	integer	Select where the wave field should be taken from. 0 : wave generated from the data in parametric_wave 1 : wave read from ascii version of ITM cpos, written using write_cpo in the write_structures module. Filename is specified in ascii_itm_wave/filename_ascii_itm_wave.
/rfof_parameters/rfof_wave_param/parametric_wave	--Directory--	
nfreq	integer	Number of RF frequencies
nnphi	integer	Number of toroidal modes per frequency
RFpower	RFOF_FloatList	Power provided by the RF wave field
EfieldNormalisation	RFOF_FloatList	Normalisation factor for the strength of the RF wave field
ratioEPlusOverEMinus	RFOF_FloatList	Ratio between the left- and right-hand polarized electric wave field components
freq	RFOF_FloatList	RF wave frequency [Hz]
nphi	RFOF_IntegerList	Toroidal mode number
kperp	RFOF_FloatList	Perpendicular wave number [1/m]
verticalCentre	RFOF_FloatList	Vertical centre of the Gaussian RF wave field [m]
verticalWidth	RFOF_FloatList	Vertical width of the Gaussian RF wave field [m]
filename_lion_fields	string	Filename for lion corfields-file
/rfof_parameters/rfof_wave_param/ascii_itm_wave	--Directory--	
filename_ascii_itm_wave	string	Name of input file containing the ITM cpo waves in ascii format written using write_cpo in the write_structures module
/rfof_parameters/rfof_wrapper_param	--Directory--	
/rfof_parameters/rfof_wrapper_param/time_stepping	--Directory--	
NtimeSteps	nonNegativeInteger	Number of time steps (of standalone RFOF orbit tracer).
dt	RFOF_FloatPositive	Length of each time step [s].
nStoreOutTimes	integer	Number of time steps between which the output is accumulated before being written to file.
/rfof_parameters/rfof_wrapper_param/magnetic_field	--Directory--	
R0	float	Major radius of the plasma torus [m].
aminor	float	Minor radius of the plasma torus [m].
B0	float	Magnetic field strength att the magnetic axis [T].
q	float	Safety factor of the magnetic field.

Name	Type	Restrictions
/rfof_parameters/rfof_wrapper_param/markers	--Directory--	Defining the initial conditions for the markers in the RFOF wrapper
species_index	integer	Species index within the vector of particle species in the rfof_plasma_param/composition/*(), where * is amn, zn and zion. species_index has be in the range [1,rfof_plasma_param/composition/n_species]
weight	float	Marker weight
R	float	Initial major radius position of the marker [m]
z	float	Initial veritical position of the marker [m]
phi	float	Initial toroidal angle of the marker [rad]
charge	float	Charge of the marker [au]
mass	float	Mass of the marker [au]
E	float	Energy of the marker [eV]
xi	float	Pitch-angle of the marker [-]

4.4.19.2 Locally defined types

Name	Type	Descriptions
integer_minInclusive_1	integer	Min(<=): 1
integer_minInclusive_2	integer	Min(<=): 2
integer_minmaxInclusive_12	integer	Min(<=): 1 Max(>=): 2
integer_minmaxInclusive_14	integer	Min(<=): 1 Max(>=): 4
integer_minmaxInclusive_01	integer	Min(<=): 0 Max(>=): 1
float_minmaxInclusive_dot0001_dot01	float	Min(<=): 1.e-4 Max(>=): 0.1
float_minmaxInclusive_mendeleiv	float	Min(<=): 1.0 Max(>=): 300.0
RFOF_FloatPositive	float	Min(<): 0.0
RFOF_FloatList	float	
RFOF_IntegerList	integer	

last update: 2015-08-07 by dpc

4.4.20 ascot

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for ASCOT

Namespace: `http://solps-mdsplus.aug.ipp.mpg.de/wsvn/ascot/`

4.4.20.1 Code parameter tree

Name	Type	Restrictions

Name	Type	Restrictions
/nml_runtol	--Directory--	
options_tmax	FloatPositive	Particle tracing time (s)
binlim_dtglob	FloatNonNegative	Time step of ensemble time step model (s, 0 = disable model)
options_tinter	float	Time interval of particle data output (s, 0 to output every point, < 0 for no output)
options_cpumax	FloatPositive	Maximum allowed CPU time per particle (s) (0 = no CPU limit)
options_toler	FloatPositive	Relative error tolerance for guiding centre step
options_tbfrac	positiveInteger	Default time step is bounce time divided by this
options_colaac	FloatPositive	Allowed relative change in energy or absolute change in pitch per time step due to collisions
options_eleaac	FloatPositive	Allowed relative change in parallel velocity per time step due to the toroidal or parallel electric field
options_difaac	FloatPositive	Allowed change in rho per time step relative to the banana width due to radial diffusion
options_elhaac	FloatPositive	Allowed relative change in parallel momentum per time step caused by parallel momentum diffusion due to LH wave (for electrons)
options_ilhaac	FloatPositive	Allowed relative change in perpendicular energy per time step, caused by LH wave (for ions)
options_icraac	FloatPositive	Allowed relative change in energy per time step caused by IC wave (for ions)
options_intact	IntegerList	Particle-background interaction mechanisms (1=active, 0=inactive): intact(1) - toroidal (1) or parallel (2) electric field; intact(2) - pitch collisions; intact(3) - energy collisions; intact(4) - anomalous radial diffusion: 0 = no radial diffusion, 1 = constant diffusion coefficient, 2 = microturbulence model by Hauff et al; intact(5) - parallel momentum diffusion caused by LH wave (for electrons); intact(6) - perpendicular energy and radial diffusion caused by LH wave (for ions); intact(7) - velocity component change caused by IC wave (for ions); intact(8) - charge exchange (CX) collisions; intact(9)...intact(10) not in use.
options_quitcr	FloatList	End criteria (1=active, 0=inactive): quitcr(1) - time maximum per particle exceeded; quitcr(2) - CPU time maximum per particle exceeded; quitcr(3) - quitcr(3) * local thermal energy reached; quitcr(4) - hit the wall or a divertor target; quitcr(5) - escaped from plasma; quitcr(6) - quitcr(6) orbits calculated; quitcr(7) - quitcr(7) keV particle energy reached; quitcr(8)...quitcr(10) not in use
options_acc	IntegerBinary	Interaction acceleration on/off (1/0)
options_relat	IntegerBinary	Relativistic / classical treatment (1/0)za
options_icoord	IntegerBinary	Coordinate system: 0 = Cartesian everywhere, 1 = Boozer inside plasma, Cartesian outside
options_imeth	IntegerBinary	GC orbit integration method (only affects integration in Boozer coordinates, Cartesian always uses RK5): 0 = 4th order Runge-Kutta, no error monitoring; 1 = 5th order Runge-Kutta with error monitoring; (2 = Bulirsch-Stoer with error monitoring - not tested!)
options_orbitmode	IntegerBinary	
options_wallmode	Integer012	
options_regenr	Integer012	
options_divorb	IntegerBinary	
options_iseed	positiveInteger	
options_iskip1	nonNegativeInteger	

Name	Type	Restrictions
options_iskip2	nonNegativeInteger	
maxwcol_pfilim	FloatPositive	
options_dynamic	IntegerBinary	
options_reversedTime	boolean	
/nml_epcpar	--Directory--	
binlim_epcr1	FloatNonNegative	
binlim_epcr2	FloatNonNegative	
binlim_iepcrh	positiveInteger	
binlim_epct1	FloatMax360	
binlim_epct2	FloatPositiveMax360	
binlim_iepcth	positiveInteger	
/nml_dists	--Directory--	
distrib_idists	IntegerBinaryList	
distrib_ntime	positiveInteger	
distrib_R1	FloatNonNegative	
distrib_R2	FloatNonNegative	
distrib_nR	nonNegativeInteger	
distrib_z1	float	
distrib_z2	float	
distrib_nz	nonNegativeInteger	
distrib_rho1	FloatNonNegative	
distrib_rho2	FloatNonNegative	
distrib_nrho	nonNegativeInteger	
distrib_nvrho	nonNegativeInteger	
distrib_theta1	FloatMax360	
distrib_theta2	FloatPositiveMax360	
distrib_ntheta	nonNegativeInteger	
distrib_nvtheta	nonNegativeInteger	
distrib_vmgn1	FloatNonNegative	
distrib_vmgn2	FloatNonNegative	
distrib_nvmagn	nonNegativeInteger	
distrib_vpar1	float	
distrib_vpar2	float	
distrib_nvpar	nonNegativeInteger	
distrib_vperp1	FloatNonNegative	

Name	Type	Restrictions
distrib_vperp2	FloatNonNegative	
distrib_nvperp	nonNegativeInteger	
distrib_npitch	nonNegativeInteger	
/nml_tokamk	--Directory--	
ripple_ncoil	nonNegativeInteger	
ripple_coil2	Float0to1	
machine_ept	float	
machine_divr	FloatList8	
machine_divz	FloatList8	
/nml_eradl	--Directory--	
erprof_eronof	Integer01234	
erprof_eront	FloatNonNegative	
erprof_ermin	float	
erprof_ermax	float	
erprof_errho1	FloatNonNegative	
erprof_errho2	FloatNonNegative	
erprof_errho3	FloatNonNegative	
/nml_ersc	--Directory--	
erself_ierson	IntegerBinary	
erself_idpol	IntegerBinary	
erself_idvisc	IntegerBinary	
erself_iersri	IntegerBinary	
erself_iersro	IntegerBinary	
erself_ersrh1	FloatNonNegative	
erself_ersrh2	FloatNonNegative	
erself_ersvim	FloatNonNegative	
/nml_andiff	--Directory--	
andiff_rholim1	float	
andiff_rholim2	float	
andiff_dcoeff	float	
andiff_lambda_c	float	
andiff_lambda_V	float	
andiff_lambda_B	float	

Name	Type	Restrictions
andiff_B_r_scale	float	
andiff_V_E	float	
andiff_logon	integer	
/nml_nbi	--Directory--	
nbi_rfocus	float	
nbi_alfa	float	
nbi_betav	float	
nbi_betah	float	
nbi_nlambda	float	
/nml_lhwave	--Directory--	
lhoper_freq	float	
lhoper_kpar	float	
lhoper_kper	float	
lhoper_epar	float	
lhoper_eper	float	
lhoper_vprg	FloatNonNegative	
lhoper_rho0	Float0to1	
lhoper_rhod	Float0to1	
lhoper_symm	Integer012	
/nml_icwave	--Directory--	
icoper_icspec	IntegerMin2	
icoper_icrho	Float0to1	
icoper_icside	IntegerBinary	
icoper_icepos	float	
icoper_iceneg	float	
icoper_ickpar	float	
icoper_ickper	float	
icoper_icl	FloatNonNegative	
icoper_icn	Integer12	
/nml_cxdiag	--Directory--	
npacx_nsl	Integer0to15	
npacx_rpiv	FloatList	
npacx_zpiv	FloatList	

Name	Type	Restrictions
npacx_hoff	FloatList	
npacx_lfoc	FloatList	
npacx_bhor	FloatList	
npacx_aver	FloatList	
npacx_dlt	FloatList	
npacx_nwin	Integer0to15	
npacx_ene1	FloatList	
npacx_ene2	FloatList	
npacx_tmo1	float	
npacx_tmo2	float	
npacx_3d	IntegerBinary	
npacx_the1	FloatList	
npacx_the2	FloatList	
/nml_mhd	--Directory--	
mhd_on	IntegerBinary	
mhd_num	integer	
mhd_modetype	IntegerBinaryList	
mhd_mpol	IntegerList	
mhd_ntor	IntegerList	
mhd_amp	FloatList	
mhd_omg	FloatList	
mhd_dom	FloatList	
mhd_phase	FloatList	
mhd_rho	FloatList	
mhd_alpha	FloatList	
mhd_beta	FloatList	
mhd_gamma	FloatList	
mhd_c0	FloatList	
mhd_k1	FloatList	
mhd_k2	FloatList	
/nml_debug	--Directory--	
debug_orbits	boolean	
debug_writeseeds	boolean	
debug_nbilog	boolean	
debug_BpolFromPsi	boolean	

Name	Type	Restrictions
debug_endstate	boolean	
debug_cpu	boolean	
/nml_cachesort	--Directory--	
options_cachesort	boolean	
/nml_mgmodel	--Directory--	
mgmodel_model	IntegerBinary	
mgmodel_B0	float	
mgmodel_I0	float	
mgmodel_alpha	float	
mgmodel_a	float	
mgmodel_adistance	float	
mgmodel_R0	float	
mgmodel_z0	float	
mgmodel_machineR0	float	
mgmodel_machinez0	float	
/rfof_core_param	--Directory--	
/rfof_core_param/assumptions	--Directory--	List of optional physics assumptions.
simplify__static_resonance_position_during_RF_kick	boolean	If true then the RF intraction induces no spatial motion of the orbit during the wave-particle interaction (however the new drift orbit may have a different spatial extent)
simplify__drift_velocity_no_effect_on_resonance	boolean	If true then all term in the resonance condition involving the drift velocity are neglected
simplify__parallel_velocity_no_effect_on_resonance	boolean	If true then all term in the resonance condition involving the parallel velocity are neglected
simplify__assume_zero_larmor_radius_in_KPERPxRHO	boolean	If ”true”, then the finite larmor radius effects in the wave particle interaction are neglected
simplify__kpar_is_nphi_over_R	boolean	If ”true” then the parallel wave number of is nphi/R, otherwise the exact value is used
width_of_rf_resonance_layer	float	Width of the resonance layer as a fraction of the momentary major radius
/rfof_core_param/bounding_box	--Directory--	Bounding box in the poloidal cross section.
Rmin	float	Minimum major radius of the bounding box [m]
Rmax	float	Maximum major radius of the bounding box [m]
Zmin	float	Minimum vertical coordinate of the bounding box [m]
Zmax	float	Maximum vertical coordinate of the bounding box [m]
/rfof_core_param/resonance_memory	--Directory--	

Name	Type	Restrictions
nStoreTimes	integer	The number of time points to be stored in the resonance memory. These are used to extrapolate the orbit to the next upcoming resonance.
/rfof_core_param/IO_control	--Directory--	Controlling the output written to file
start_time_event_output	float	Time at which to start generating event-output files
output__2D_RZ_out	boolean	If true, then 2D output in (R,Z) will be generated for the density of abosorbed power and torque
output__Orbit	boolean	If true, then output of the full orbits wil be generated and stored to file
MAX_number_of_points_stored_in_the_Orbit	integer	Maximum number of orbit points written to file
output__rf_kicks	boolean	If true, then a list of rf-kicks will be generated containing the location and strength of the kick
MAX_number_of_points_stored_in_the_rf_kick	integer	Maximum number of rf-kick points written to file
output__resonace_predictions	boolean	If true, then a list of rf-resonance preditions will be generated containing the present location and predicted location of the next resonance
MAX_number_points_stored_in_resonance_memory	integer	Maximum number of rf-resonance prediction points written to file

4.4.20.2 Locally defined types

Name	Type	Descriptions
IntegerBinary	integer	Min(<=): 0 Max(>=): 1
IntegerList	integer	
IntegerList10	IntegerList	Length: 10
IntegerBinaryList	IntegerBinary	
IntegerBinaryList20	IntegerBinaryList	Length: 20
FloatList	float	
FloatList8	FloatList	Length: 8
FloatList10	FloatList	Length: 10
FloatPositive	float	Min(<): 0.0
FloatNonNegative	float	Min(<=): 0.0
FloatMax360	float	Max(>=): 360.0
FloatPositiveMax360	float	Min(<=): 0.0 Max(>=): 360.0
Float0to1	float	Min(<=): 0.0 Max(>=): 1.0
IntegerMin2	integer	Min(<=): 2
Integer012	integer	Min(<=): 0 Max(>=): 2
Integer12	integer	Min(<=): 1 Max(>=): 2
Integer01234	integer	Min(<=): 0 Max(>=): 4

Name	Type	Descriptions
Integer0to15	integer	Min(<=): 0 Max(>=): 15

last update: 2012-03-28 by tjohnson

4.4.21 hcd2coresource

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for hcd2coresource

Namespace:

4.4.21.1 Code parameter tree

Name	Type	Restrictions
verbosity	positiveInteger	Regulates the amount of standard output; higher values gives more output

4.4.21.2 Locally defined types

Name	Type	Descriptions
positiveInteger	integer	Min(<=): 1

last update: 2015-08-07 by dpc

4.4.22 hcd2corefast

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

Description: Code parameters for hcd2coresource

Namespace:

4.4.22.1 Code parameter tree

Name	Type	Restrictions
verbosity	positiveInteger	Regulates the amount of standard output; higher values gives more output

4.4.22.2 Locally defined types

Name	Type	Descriptions
positiveInteger	integer	Min(<=): 1

last update: 2015-08-07 by dpc

last update: 2019-01-31 by g2dpc

5 Datastructures (CPOs)

This page give you overview information on the datastructures (CPOs [144]) that are most relevant for IMP5. Detailed information on all ITM datastructures can be found here [145].

CPOs [146] for which IMP5 are responsible.

CPO	Description
antennas (type [147], fortran [148])	The antennas CPO describe of antennas used for IC, EC and LH heating and current drive. The data stored in the CPO includes both hardware descriptions, like the antenna geometry, settings like the power launched and the frequency. The antennas CPO may include the descriptions of multiple systems in each frequency range, i.e. we may have several IC antennas, several LH launcher and several EC systems.
launchs (type [149], fortran [150])	*WARNING, this CPO is under restructuring and the present version should NOT be used! (2014-03-17)* The idea of this CPO is to describe the coupling of LH waves.
waves (type [151], fortran [152])	The waves CPO describe wave fields, primarily those used for heating and current drive. The wave fields can be described in two diffferent form; either as a global wave fiedl calculated at every point in the devise, or as a set of beams, or rays.
nbi (type [153], fortran [154])	The NBI CPO describes the NBI (neutral beam injection) system. The main purpose of the CPO is to be used to calculate the neutrals that reach the plasma. The CPO includes both variable setting like the acceleration energy and the input power, as well as a description of the beam geometry. The geometry is separated into two levels, one describing including so called "beamlet groups" that form a type of focussed beam with a focal length. The second level is that every beamlet group includes individual "beamlets". Each of these beamlets originate form a small hole in the grounded grid. Since all particles coming out of one such hole has been accelerated by somewhere between 50keV and 1.5 MeV, they all have almost the same velocity vector. The tiny variations in this velocity vector has a Gaussian shape and is specified as the beamlet divergence.
distsource (type [155], fortran [156])	Source terms for kinetic plasma model; e.g. the source of neutral beam particles or alpha particles. This data should come from a beam deposition code and should serve as input to kinetic codes, e.g. Fokker-Planck codes.
distribution (type [157], fortran [158])	Distribution functions of particles involved in the heating. E.g. the velocity distribution function of fast ions/electrons driven by RF, or the distribution function of alpha particles, or beam injected ions. The CPO should be filled in by a kinetic code and provide heating and provide, e.g. heating and current drive for transport solvers.

Additional material about the IMP5 CPOs:

IMP5 CPOs (pdf [159]) (ppt [160]) from the General ITM meeting september 2010 in Lisbon.

CPOs [161] commonly used by IMP5 codes.

CPO	Description
equilibrium (type [162], fortran [163])	Magnetic equilibrium.
coreprof (type [164], fortran [165])	Profiles of densities, temperatures, flows,... in the plasma core.
coreprof (type [166], fortran [167])	Profiles of impurity densities... in the plasma core.

144 https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo
145 https://www.efda-itm.eu/ITM/html/isip_data_structure.html#isip_data_structure
146 https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo
147 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#antennas
148 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#antennas_Fortran
149 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#launchs
150 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#launchs_Fortran
151 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#waves
152 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#waves_Fortran
153 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#nbi
154 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#nbi_Fortran
155 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#distsource
156 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#distsource_Fortran
157 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#distribution
158 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#distribution_Fortran
159 https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_CPOs_ITM-GM2010.pdf
160 https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_CPOs_ITM-GM2010.ppt
161 https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo
162 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#equilibrium
163 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#equilibrium_Fortran
164 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#coreprof
165 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#coreprof_Fortran
166 https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#coreprof
167 https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#coreprof_Fortran

CPO	Description
coreprof (type [168], fortran [169])	New in 4.10b! Fluid moments of non-thermal particles, e.g. densities, parallel and perpendicular pressure etc. The data is derived from the distribution CPO; it summarises the distribution CPO for e.g. transport codes, MHD codes, but can also be used in wave codes to simulate the wave absorption on fast-ion populations.
coresource (type [170], fortran [171])	Sources of particles, momentum and heat to ETS.

The IMP5 only uses certain parts of the CPOs defined above, see list of cpos-fields used by IMP5 codes (5.1).

5.1 CPOs used by IMP5

Here follows a preliminary lists of the cpo-fields used by most, but not all, IMP5 codes.

To identify the importance of a cpo-field there is a priority index in the table below. Here are the definitions of priority indexes:
0 = undefined priority
1 = high priority; required by imp5 actors
2 = low priority; recalculated in the code if not provided
3 = non-mandatory, but used when provided (e.g. plasma may be used, but if the field is not provided it assumed to be zero)

In the equilibrium CPO:

Priority	CPO-field	Used by codes	Comments
1	equilibrium(*)%global_param%mag_axis%position%r	Gray (4.1.1), Mars (4.3.1), Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), TORIC (4.2.1), FWTOR (4.1.6)	
1	equilibrium(*)%global_param%mag_axis%position%z	Gray (4.1.1), Mars (4.3.1), Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), TORIC (4.2.1), FWTOR (4.1.6)	
1	equilibrium(*)%global_param%mag_axis%bphi	Mars (4.3.1), BBNBI (4.2.3), TORIC (4.2.1), FWTOR (4.1.6)	
1	equilibrium(*)%global_param%mag_axis%q	Mars (4.3.1), EVE (4.2.1), TORIC (4.2.1), FWTOR (4.1.6),	
1	equilibrium(*)%global_param%toroid_field%r0	FPSIM (4.2.2), Gray (4.1.1), Mars (4.3.1)	
1	equilibrium(*)%global_param%toroid_field%b0	FPSIM (4.2.2), Gray (4.1.1), Mars (4.3.1)	
1	equilibrium(*)%global_param%psi_bound	Gray (4.1.1), Mars (4.3.1), BBNBI (4.2.3), EVE (4.2.1)	
1	equilibrium(*)%global_param%psi_ax	Gray (4.1.1), EVE (4.2.1), Mars (4.3.1)	
1	equilibrium(*)%global_param%i_plasma	Nemo (4.2.3), BBNBI (4.2.3), Mars (4.3.1)	
1	equilibrium(*)%profiles_1d%rho_tor	Partically all IMP5 codes (4).	
1	equilibrium(*)%profiles_1d%psi	Partically all IMP5 codes (4).	
1	equilibrium(*)%profiles_1d%q	Gray (4.1.1), Mars (4.3.1), Toray-FOM (4.1.1), EVE (4.2.1), TORIC (4.2.1), FWTOR (4.1.6)	
1	equilibrium(*)%profiles_1d%f_dia	FPSIM (4.2.2), Gray (4.1.1), Mars (4.3.1), Toray-FOM (4.1.1), EVE (4.2.1), TORIC (4.2.1)	
1	equilibrium(*)%profiles_1d%ffprime	Mars (4.3.1)	
1	equilibrium(*)%profiles_1d%pressure	Mars (4.3.1)	
1	equilibrium(*)%profiles_1d%pprime	Mars (4.3.1)	
1	equilibrium(*)%profiles_1d%r_inboard	FPSIM (4.2.2)	
1	equilibrium(*)%profiles_1d%r_outboard	FPSIM (4.2.2)	
1	equilibrium(*)%profiles_1d%vprime	Nemo (4.2.3)nbisim (4.2.5)	
1	equilibrium(*)%profiles_1d%dpsidrho_tor	Nemo (4.2.3)	
1	equilibrium(*)%profiles_1d%volume	Gray (4.1.1), Nemo (4.2.3), BBNBI (4.2.3), Toray-FOM (4.1.1)	
1	equilibrium(*)%profiles_1d%phi	TORIC (4.2.1)	
1	equilibrium(*)%profiles_1d%ftrap	Required by pratically all waves codes	
2	equilibrium(*)%profiles_1d%b_av	Pratically all ECRH codes (4.1)	
2	equilibrium(*)%profiles_1d%b_min	Pratically all ECRH codes (4.1)	
2	equilibrium(*)%profiles_1d%b_max	Pratically all ECRH codes (4.1)	
1	equilibrium(*)%profiles_2d%grid_type	All codes using 2D-profiles information	

[168] https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#coreprof
[169] https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#coreprof_Fortran
[170] https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#coresource
[171] https://www.efda-itm.eu/ITM/html/cpoinstances__4.09a.html#coresource_Fortran

Priority	CPO-field	Used by codes	Comments
1	equilibrium(*)%profiles_2d%grid%dim1	Gray (4.1.1) with (R,Z) grid, Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), FWTOR (4.1.6)	
1	equilibrium(*)%profiles_2d%grid%dim2	Gray (4.1.1) with (R,Z) grid, Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), FWTOR (4.1.6)	
1	equilibrium(*)%profiles_2d%r	Gray (4.1.1) with (rho,theta) grid and Nemo (4.2.3) with alt. coordinantes no 1	
1	equilibrium(*)%profiles_2d%z	Gray (4.1.1) with (rho,theta) grid and Nemo (4.2.3) with alt. coordinantes no 1	
1	equilibrium(*)%profiles_2d%psi	Gray (4.1.1) with (rho,theta) grid, Nemo (4.2.3) with alt. coordinantes no 1, BBNBI (4.2.3), Toray-FOM (4.1.1), FWTOR (4.1.6)	
0	equilibrium(*)%profiles_2d%theta		
1	equilibrium(*)%profiles_2d%br	Gray (4.1.1), Nemo (4.2.3), Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), FWTOR (4.1.6)	
1	equilibrium(*)%profiles_2d%bz	Gray (4.1.1), Nemo (4.2.3), Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), FWTOR (4.1.6)	
1	equilibrium(*)%profiles_2d%bphi	Gray (4.1.1), Nemo (4.2.3), Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), FWTOR (4.1.6)	
1	equilibrium(*)%coord_sys%position%r	Nemo (4.2.3) with alt. coordinantes no 1, Mars (4.3.1), TORIC (4.2.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%position%z	Nemo (4.2.3) with alt. coordinantes no 1, Mars (4.3.1), TORIC (4.2.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%grid%dim1	Gray (4.1.1), Mars (4.3.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%grid%dim2	Gray (4.1.1), Mars (4.3.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%jacobian	Mars (4.3.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%g_11	Mars (4.3.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%g_12	Mars (4.3.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%g_22	Mars (4.3.1), EVE (4.2.1)	
1	equilibrium(*)%coord_sys%g_33	Mars (4.3.1), EVE (4.2.1)	
1	equilibrium(*)%eqgeometry%a_minor	Nemo (4.2.3), Mars (4.3.1), BBNBI (4.2.3), FWTOR (4.1.6)	
1	equilibrium(*)%eqgeometry%geom_axis%r	Nemo (4.2.3), Mars (4.3.1), Torbeam (4.1.1), BBNBI (4.2.3), Toray-FOM (4.1.1), EVE (4.2.1), TORIC (4.2.1), FWTOR (4.1.6)	
1	equilibrium(*)%eqgeometry%boundary%r	Gray (4.1.1), TORIC (4.2.1)	
1	equilibrium(*)%eqgeometry%boundary%z	Gray (4.1.1), TORIC (4.2.1)	
1	equilibrium(*)%eqgeometry%xpts%r	BBNBI (4.2.3)	
1	equilibrium(*)%eqgeometry%xpts%z	BBNBI (4.2.3)	
1	equilibrium(*)%eqgeometry%elongation	BBNBI (4.2.3), FWTOR (4.1.6)	

In the coreprof CPO:

Priority	CPO-field	Used by codes	Comments
1	coreprof(*)%rho_tor	Pratically all IMP5 codes (4)	
1	coreprof(*)%rho_tor_norm	Pratically all IMP5 codes (4)	
1	coreprof(*)%psi%value	Pratically all IMP5 codes (4)	
1	coreprof(*)%ni%value	Pratically all IMP5 codes (4)	
1	coreprof(*)%ne%value	Pratically all IMP5 codes (4)	
1	coreprof(*)%Ti%value	Pratically all IMP5 codes (4)	
1	coreprof(*)%Te%value	Pratically all IMP5 codes (4)	
1	coreprof(*)%composition%amn	Pratically all IMP5 codes (4)	
1	coreprof(*)%composition%zn	Pratically all IMP5 codes (4)	
1	coreprof(*)%composition%zion	Pratically all IMP5 codes (4)	

In the waves CPO:

Priority	CPO-field	Used by codes	Comments
1	waves(*)%coherentwave(*)%global_param%frequency	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%global_param%power_tot	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%global_param%type	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%global_param%ntor	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%global_param%pow_i	FPSIM (4.2.2)	

Priority	CPO-field	Used by codes	Comments
1	waves(*)%coherentwave(*)%composition%amn	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%composition%zion	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%grid_1d%rho_tor	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%grid_1d%psi	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%grid_2d%theta	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%profiles_1d%powd_ntor_i	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%profiles_2d%powd_ntor_i	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%fullwave%e_plus	FPSIM (4.2.2)	
1	waves(*)%coherentwave(*)%fullwave%e_minus	FPSIM (4.2.2)	

In the distsource CPO:

Priority	CPO-field	Used by codes	Comments
1	distsource(*)%composition%amn	NBISIM (4.2.5)	
1	distsource(*)%composition%zn	NBISIM (4.2.5)	
1	distsource(*)%source(*)%src_spec	NBISIM (4.2.5)	
1	distsource(*)%source(*)%profiles_1d%rho_tor	NBISIM (4.2.5)	
3	distsource(*)%source(*)%profiles_1d%rho_tor_norm	NBISIM (4.2.5)	
1	distsource(*)%source(*)%profiles_1d%psi	NBISIM (4.2.5)	
1	distsource(*)%source(*)%profiles_1d%pow_den%value	NBISIM (4.2.5)	
1	distsource(*)%source(*)%profiles_1d%src_rate%value	NBISIM (4.2.5)	
0	distsource(*)%source(*)%source_grid%grid_info%grid_coord	NBISIM (4.2.5)	If either `...%profiles_1d%pow_den%value` or `...%profiles_1d%src_rate%value` are NOT associated, only then is `...%grid_info%grid_coord` used.
0	distsource(*)%source(*)%source_grid%grid_info%discrete_dims	NBISIM (4.2.5)	If either `...%profiles_1d%pow_den%value` or `...%profiles_1d%src_rate%value` are NOT associated, only then is `...%grid_info%discrete_dims` used.
0	distsource(*)%source(*)%source_grid%dim<X>	NBISIM (4.2.5)	If either `...%profiles_1d%pow_den%value` or `...%profiles_1d%src_rate%value` are NOT associated, only then is `...%source_grid%dim<X>` used.

Contact Thomas Johnson (johnso@kth.se) for comments and suggestions.

---

last update: 2011-12-22 by tjohnson

5.2 Development of the IMP5 cpos for 4.10a

Below is a list of changes to the IMP5 CPOs and the state of the implementation and testing at the time of the last update (see the bottom of the page).

Contact persons: Thomas Johnson [172].

5.2.1 Overview of main changes

There are two main changes for the 4.10a release:

- We have introduced the complex-grid structure (so called grid-cpo) for multidimensional arrays in waves, distsource and distribution. However, the old structures are kept to simplify the transition (since the 4.10a version is only for testing).
- A set of identifiers has been added to trace the dataflow from `antennas/nbi/nuclear reactions` to `waves/distsource/distribution` .

[172] https://www.efda-itm.eu/ITM/html/itm_contact_list_2010.html#contact_thomas_johnson

5.2.2 distsource

- Replace `source_mark` with the field `markers` of the complexType `weighted_marker`.

  Implemented : YES

- Replace `source_grid` with the complexgrid based representation `source_rate`.
  The new representation has two fields `grid` and `source_rate`.
  NOTE: `source_grid` has been kept to get a smooth transition to using `source_rate`.

  Implemented : YES

- The field `gyrosrc_type` previously appeared in several places along, but has now been replaced by a single field `distsource()%source()%gyro_type`.

  Fields removed: `distsource()%source()%source_grid%gyrosrc_type` and `distsource()%source()%source_mark%g`
  .

  Implemented : YES

- New element `source_id` for both identifying the origin of the source, and for identifying this source when used in `distribution`.

  See also the translation table (**??**). of the identifier part of source_id.

  Documentation: *List of identifiers for the source, in term the type and name of the injectors and reactions that provide the source, along with an index separating sources with the same name and type. Possible content for type: NBI or reaction names (see specifications on the ITM webpages); the field name should either be taken from `nbi(*)%nbi_unit(*)%name`, or describe the populations involved in the reaction, e.g. fast-thermal; the field index should separate different sources generated from a single injector or reaction. Vector(n_injectors_and_reactions)*

  Background : The 4.09a version of the distsource CPO did not clearly stated where the source came from, i.e. it was not possible to trace from which NBI injector or nuclear reactions the source originated. For this reason the `source_id` has been introduced.

  Implemented : YES

- A new complexType `line_src_prof` added for representating line-sources as profiles on a monotonic rho-coordinate.
  The source is described by its spatial location (R, Z, rho, theta) and its velocity components (energy, pitch, angular momentum).

  Note: Usually beamlines enters the plasma on the low field side and exits on the high field side. In this case the line has to be split into two (or more) line-sources, thus the lines-source is an array.

  Note: Primarily added to allow a simple coupling between NEMO and RISK

  Implemented : YES

5.2.3 distribution

- Two new elements `waves_id` and `source_id` for both identifying the wave fields and sources affecting the distribution function in `distri_vec`.
  Documentation for `wave_id` : *List all waves affecting the distribution, as specified in waves(*)%coherentwave(*)%wave_id*

  See also the translation table (**??**) for the identifier part of wave_id.

  Documentation for `source_id` : *List all neutral beam injectors and reactions contributing to the source, as specified in distsource(*)%source(*)%source_id. Vector(n_injectors_and_reactions)* See also the translation table (**??**) for the identifier part of source_id.

  Implemented : YES

- Change description of distri_vec. In 4.09a `distri_vec` is described as a vector of length `n_spec`, which is misleading. `distri_vec` should be a vector over sources, where each source can only represent a single species, while one species can appear in many sources. In the new version `distri_vec` is a vector of length `ndistri_vec`

  Implemented : YES

- Add new field distribution(*)%distri_vec(*)%gyro_type to separate gyro-centre and full orbit representations.

  Implemented : YES

- Add new field distribution(*)%distri_vec(*)%global_param%n_particles for the total number of particles in the distribution

  Implemented : YES

- Add new field distribution(*)%distri_vec(*)%profiles_1d%dens for the particle density of the distribution

  Implemented : YES

5.2.4 waves

- New element wave_id for both identifying the antenna driving a coherent-wave, and for identifying a coherent-wave when used in distribution and coresource .
  Documentation: *Identifier for the coherent-wave, in terms of the type and name of the antenna driving the wave and an index separating waves driven by the same antenna. Possible types: EC/LH/IC; the field name should include the name of the antenna as specified in either antennas(*)%ec_antenna%name, antennas(*)%ic_antenna%name, or antennas(*)%lh_antenna%name; the field index should separate different waves generated from a single antenna.*
  See also the translation table (**??**) for the identifier part of wave_id.

  Implemented : YES

- Replace waves()%coherentwave()%local and waves()%coherentwave()%pol_decomp with a grid-cpo representation.
  The new representation has two fields: grid and e_components .
  All wave field components previously available in local and pol_decomp are available in the e_components .

  Note : waves()%coherentwave()%local and waves()%coherentwave()%pol_decomp are both kept to simplify the transition from 4.09b.

  Implemented : YES

5.2.5 antennas

- Replace the array antenna_unit by introducing arrays of the fields antenna_ec , antenna_lh and antenna_ic .

  Implemented : YES

- Suggestion: adopt for compatability with reflectometry, e.g. allowing modulation of the frequency.

  Implemented : NO

- **Question** : Are the machine description fields in the ec_antenna correctly labeled, or should the machine description fields be more primitive/closer to the hardware parameters?

5.2.6 nbi

- Add a name for each injector unit.

  Implemented : YES

5.2.7 launchs

- **Question** : Is this CPO needed?

- Suggestion: Correct the name from launchs to e.g. launchers

  Implemented : NO

5.2.8 orbit

- **Question** : Is this CPO needed?
- Correct typo: orbit/orbitt_id; new name orbit/com

  Implemented : YES
- Change parameter name: orb_glob_dat; new name global_param

  Implemented : YES
- Change parameter name: orb_trace; new name trace

  Implemented : YES
- New parameter: toroidal angle

  Implemented : YES
- Replaced word *ion* with word *particle* throghout the documentation.

  Implemented : YES

5.2.9 utilities

- New complexType `weighted_markers` added, describing an array of weighted markers in N-dimension. This complexType is used in both distsource and distribution to represent the marker representations of both particle source and particle distributions.

  Implemented : YES
- New complexType `enum_instant` added, describing an array of weighted markers in N-dimension. Specifies a specific enumerated instans of an object or process in term of its type, name and an index. E.g. the input could be the wave with index=2, selected from all waves launched by the antenna with name=A2, where the antenna is of type=IC.

  Implemented : YES

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last update: 2012-07-13 by tjohnson

5.3 The machine description shot database

This section describes a solution for how to automate the reading of machine description CPOs in Kepler. At some point ISIP will come with an elegant solution, but the ITM needs something right now (written 20130315!). Here one proposal is presented that has been implemented in Kepler.

The basis of the present solution is a new "Machine Description Shot Database" that is stored in the svn-repository

```
https://gforge6.eufus.eu/svn/itmshared/branches/machineDescriptionDatabase/
```

The actual data is stored in an xml-file:

```
xml/machineDescriptionDatabase.xml
```

formatted accoring to the schema:

```
xml/machineDescriptionDatabase.xsd
```

To types of tools have so far been developed to extract data from the database; an xslt-translation sheeth

```
xsl/machineDescriptionDatabase.xsl
```

and a python code based on xml-dom

```
xsl/*.py
```

The python code is built to translate from a tokamak-name and a tokamak-shot number to a UAL database element, described by the shot/run/user. This python code can then be used in the PythonActor in Kepler find the correct machine description files.

5.3.1 Composite actor for reading MD-shots

A composite actor has been developed that uses the database and a tokamak-shot and a tokamak-name, to read machine descriptions. The actor can be found in the machineDescriptionDatabase-repository

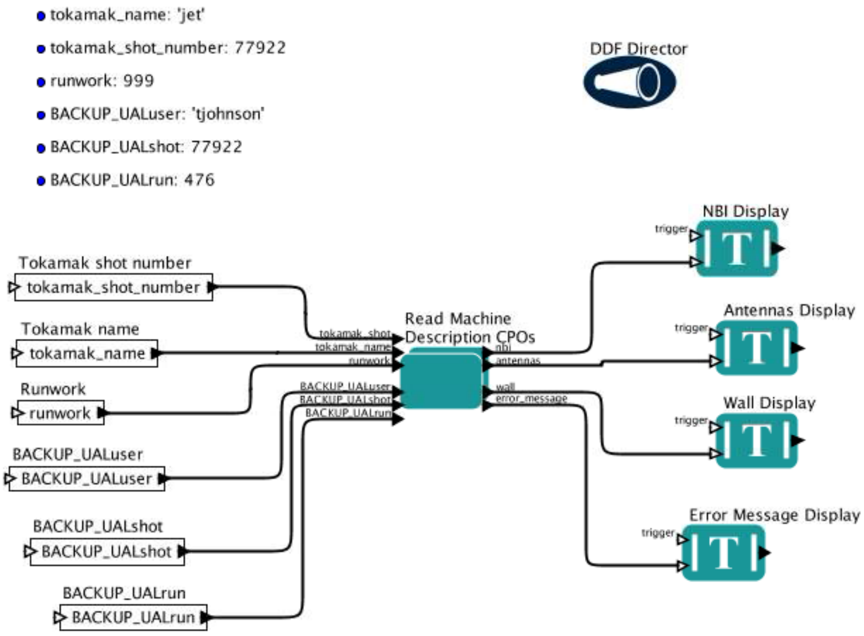
```
https://gforge6.eufus.eu/svn/itmshared/branches/machineDescriptionDatabase/
```

in the workflow xml-file

```
WORKFLOW/readFromMachineDescriptionDataBase.xml
```

5.3.1.1 Walk through the ”Composite actor for reading MD-shots”

The workflow is an ”as simple as possible” example of how to use the composite actor. Here the input parameters are defined and the composite actor is called. The returned data is then printed, see figure below.



Opening up the composite actor we find the PythonActor that generates the UAL-database info user/shot/run. The data is then forwarded to another composite actor `Select UAL run` , which also takes the input `BACKUP_UALuser` , `BACKUP_UALshot` and `BACKUP_UALrun` . The actor checks that the output from the Python is a valid run-number. If not, then return the `BACKUP_UAL...` data. Once the user/shot/run is decided these values are passed to the `UALinit` that reads the machine description CPOs from the UAL. See figures below.

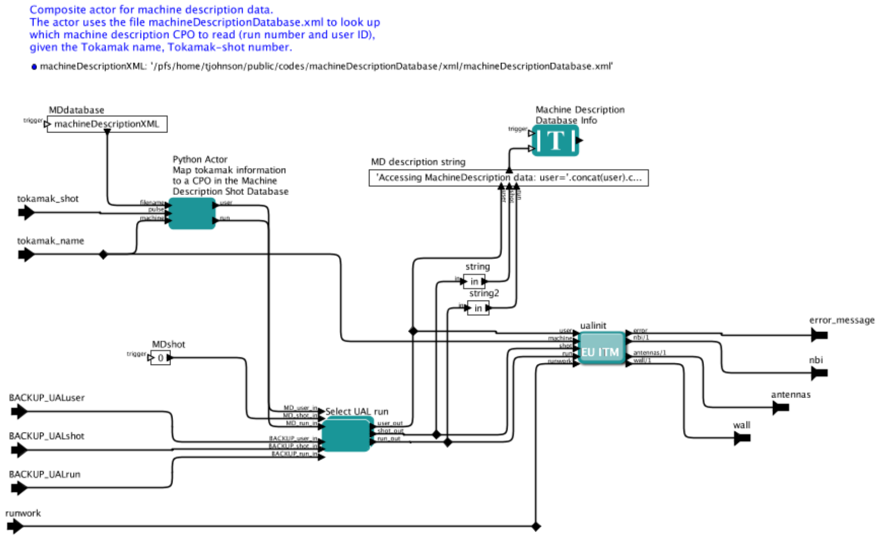
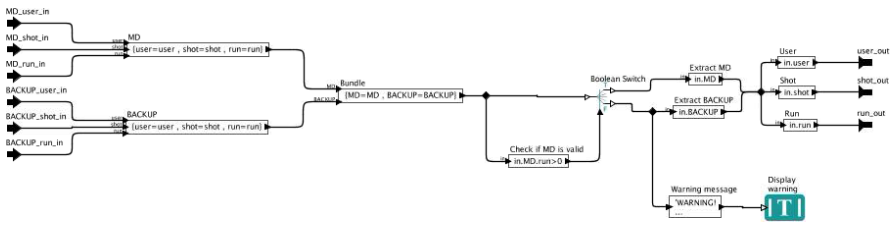


Figure below shows the structure of the `Select UAL run` composite actor.



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last update: 2019-01-31 by g2dpc

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last update: 2014-03-17 by tjohnson

6 Workflows

IMP5 have developed a number of Kepler [173] workflows.

Official workflows are stored under the GFORGE [174] project KeplerWorkflows [175]. To export a local copy of the IMP5 workflows, version 4.08a, 4.08b or 4.09a, from the repository

```
svn co https://gforge6.eufus.eu/svn/keplerworkflows/trunk/4.08a/imp5
```

```
svn co https://gforge6.eufus.eu/svn/keplerworkflows/trunk/4.08b/imp5
```

```
svn co https://gforge6.eufus.eu/svn/keplerworkflows/trunk/4.09a/imp5
```

More internal workflows useful for the IMP5 can be stored on the Gateway in the directory

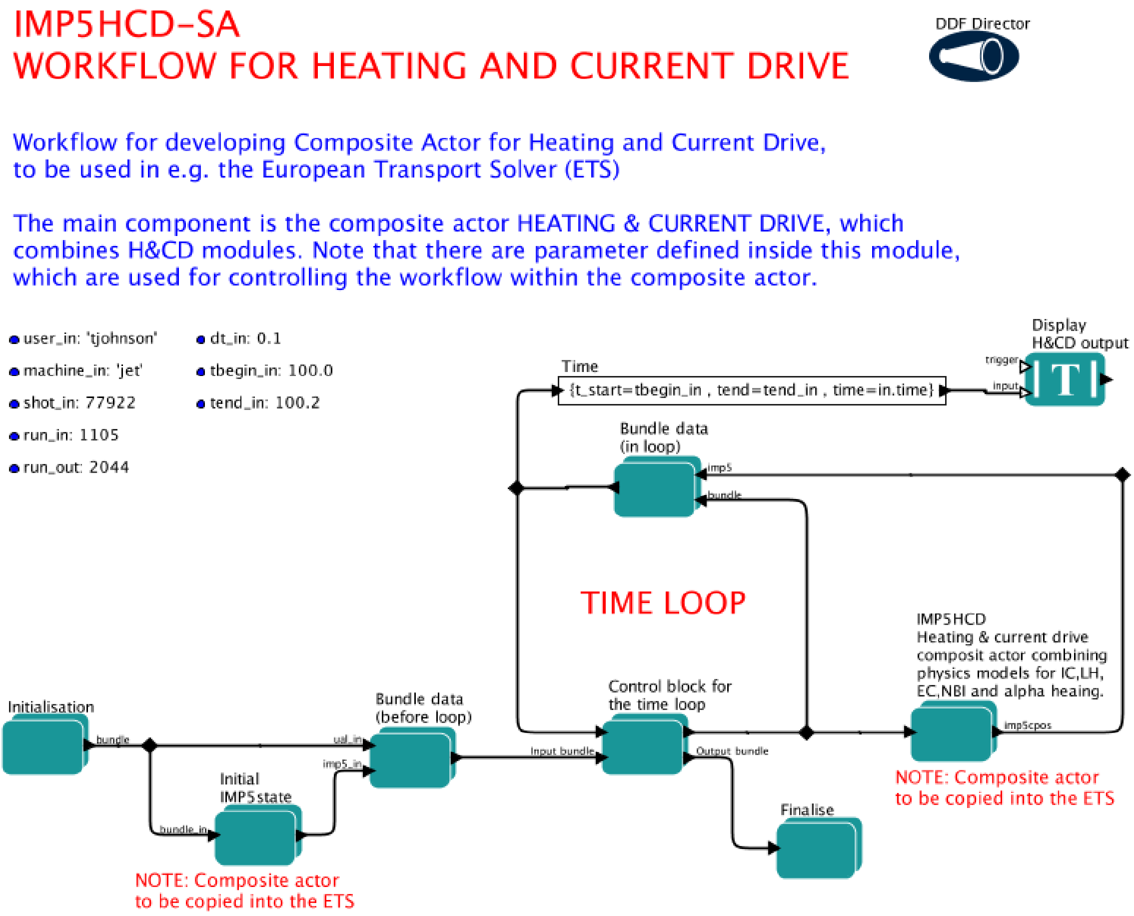
```
/afs/efda-itm.eu/imp5/user/wwwimp5/public/ITM_test/workflows/
```

[173] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_kepler
[174] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_gforge
[175] https://gforge6.eufus.eu/project/keplerworkflows/

6.1 The IMP5HCD-SA workflow

The IMP5HCD-SA (IMP5 Heating and Current Drive-Stand Alone) workflow is used for developing and testing the IMP5HCD Composite Actor [176]. The workflow runs the IMP5HCD Composite Actor for Heating and Current drive in a time loop using Equlibrium and Coreprof CPOs from the UAL and the NBI and Antenna CPOs provided by specialised CPO generators.

Contact persons: Thomas Johnson [177] (skype: tjohn74) and Lorenzo Figini [178]



6.1.1 How to configure IMP5HCD

To select **shot** and **run** numbers: double click on the Kepler-parameters `shot_in` and `run_in` and type your shot and run numbers values.

To select the time interval for the simulations: double click on the Kepler-parameters `dt_in` for the time step in seconds, `tbegin_in` for the start time, and `tend_in` for the end time of the simulation.

In addition you can select the run numbers for the output generated in each actor, `runwork_in` , and the run number to which the UALsliceCollector stores the data, `run_out`

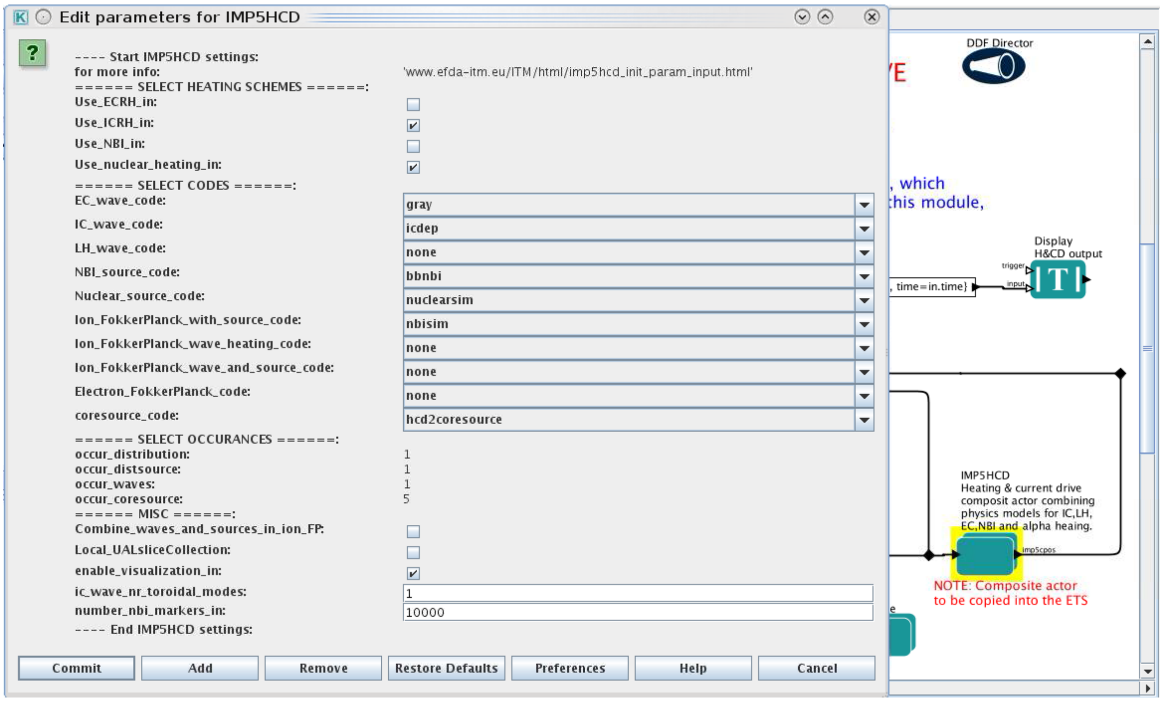
All other parameters are set through the composite actors. All paramters that are specific to a single code are stored in the `code-parameters`

- Code parameters typically describeds parameters defining the grid to be used, selects optional assumptions to be made, the amount of debugging information to print to screen, etc.
- In addition there is a class of actors call CPO-generators that generates a CPO without any physics model, e.g. the actor `nbisetup` writes an nbi-CPO with a full description of the NBI-injector hardware and geometry. Many of these actors take their information from a list of code parameters.

[176] https://www.efda-itm.eu/ITM/html/.html#imp5_compositeactor_imp5hcd
[177] https://www.efda-itm.eu/ITM/html/itm_contact_list_2010.html#contact_thomas_johnson
[178] https://www.efda-itm.eu/ITM/html/itm_contact_list_2010.html#contact_lorenzo_figini

- To edit the code parameters you open the composite-actors one by one until you reach the actor you wish to change; you double click on the actor; select `Code Parameters`).

Another type of parameters are supplied though local parameters inside the composite actors, see the figure below. In IMP5HCD such input parameters are store in two places; in the composite actors `IMP5HCD` and `Initial_IMP5_state` (found inside `H&CD INPUT`). This input allow you to select the heating schemes, physics codes and other workflow related options, e.g. the output occurances (which should not be touched at the moment as there are only a few occurances available and the current setting is almost the only possible one when running inside ETS-A).



6.1.2 Accessing the IMP5HCD-SA workflow

The IMP5HCD-SA workflow can be found in the GFORGE [179] repository KeplerWorkflows [180]. Here you find both the latest 4.10a version as well as the old 4.08a, 4.08b and 4.09a versions of the workflow, see trunk/4.08a/imp5, trunk/4.08b/imp5, trunk/4.09a/imp5 and trunk/4.10a/imp5. For checking out a local copy of the 4.10a version of the workflow:

```
svn co https://gforge6.eufus.eu/svn/keplerworkflows/trunk/4.10a/imp5/imp5hcd/  imp5hcd
```

Note that the actors used in the workflows has to be imported seperately. Importing these actors is automaized using make:

```
make import_actors
```

To open the workflow:

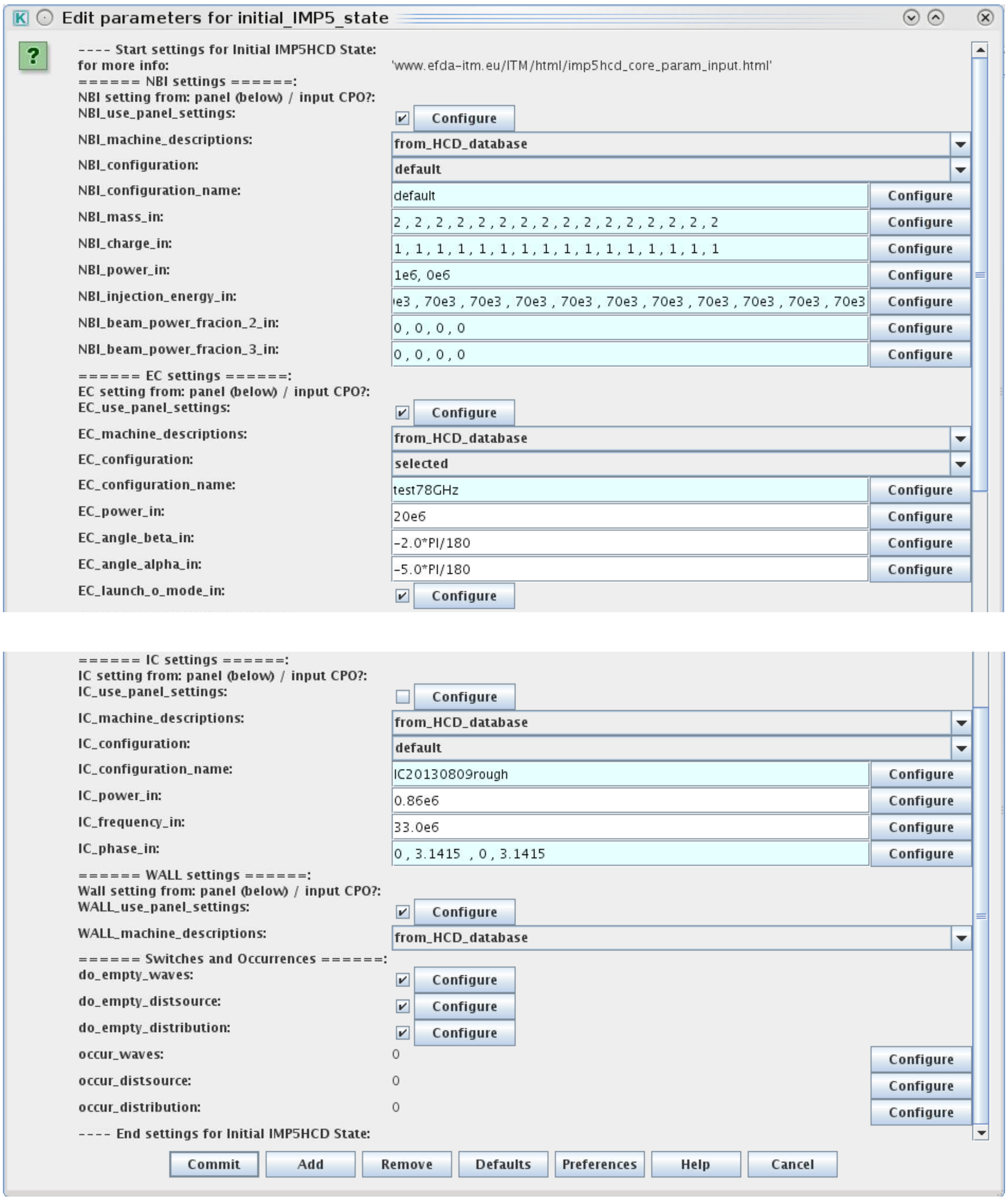
```
kepler.sh imp5hcd_sa.xml
```

OBSOLETE: Note from the IMP5HCD training, Garching 20130307 can be found here [181].

[179] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_gforge
[180] https://gforge6.eufus.eu/project/keplerworkflows/
[181] https://www.efda-itm.eu/ITM/imports/imp5/public/training_imp5hcd_20130307.pdf

6.1.3 Parameter input to the Initial IMP5 State actor

When running IMP5HCD in either IMP5HCD_sa or in the ETS, the machine paramters can be assigned using the actor **Initial IMP5 State** . To control this assignment, double click to configure the actor and fill in the pop-up panel. For more details follow the links to the NBI settings (6.1.3.1), the EC settings (6.1.3.2), the IC settings (6.1.3.3) and the wall settings (6.1.3.4).



6.1.3.1 The NBI settings panel

The NBI settings panel is the list of variables following the line
`===== NBI SETTINGS =====`
Here is a description of the variables in this panel.

- **NBI_use_panel_settings:** If `TRUE` : use the NBI settings panel to configure the NBI system. If `FALSE` : ignore the NBI settings panel and use the input CPO.
- **NBI_machine_descriptions** : Select from where the NBI hardware description should be taken
  1. `from_input_CPO` : use the NBI hardware in the CPO provided by the UAL;
  2. `from_HCD_database` : uses the a HCD-database entry for the tokamak being simulated;
  3. `from_codeparameters` : specify the NBI settings in the codeparamters of the actor nbifiller.

For all three options, dynamic quantities like power, injection energy etc. are always set according to the NBI panel settings.

- **NBI_configuration** : When using NBI data from `NBI_machine_descriptions=from_HCD_database` , then this parameter allow you to select different configurations: either you use the `default` or a `selected` configuration. In the latter case the name of the configuration is specified in **NBI_configuration_name** .
- **NBI_configuration_name** : When **NBI_machine_descriptions** = `from_HCD_database` and **NBI_configuration** = `selected` , then this parameter allow you to specify the name of your NBI configuration. The name is provided as a string and has to be one of the configurations in the list of NBI configurations (6.1.3.1.2). Note that the configuration is tied to the machine you are simulating, e.g. only ITER configurations can be used when simulating the ITER tokamak.
- **NBI_mass_in** : mass of injected species in atomic units. Vector over the beam injection units.
- **NBI_charge_in** : nuclear charge of injected species in atomic units. Vector over the beam injection units.
- **NBI_power_in** : power (W). Vector over the beam injection units.
- **NBI_injection_energy_in** : injection energy (J). Vector over the beam injection units.
- **NBI_beam_power_fraction_2_in** : fraction of the beam power injectedat half the nominal energy. Vector over the beam injection units.
- **NBI_beam_power_fraction_3_in** : fraction of the beam power injectedat a third of the nominal energy. Vector over the beam injection units.

6.1.3.1.1 Common NBI settings

Machine	mass	charge	power	injection_energy	beam_power_fraction_2	beam_power_fraction_3
ITER	2	1	33 MW	1 MeV	0	0
JET (16 PINIs)	2	1	25 MW (max 2.5 MW/PINI)	80-140 keV	0.15	0.08
MAST	2	1	4.0 MW	60 keV	0.15	0.08
AUG (PINI 1-4)	2	1	4 x 2.5 MW	60 keV	0.25	0.10
AUG (PINI 5-8)	2	1	4 x 2.5 MW	93 keV	0.25	0.10
TCV*	2	1	2.0 MW	25 keV	0.24	0.08
DEMO	2	1	90-200MW	1-2 MeV	0.0	0.0

* TCV has no beams installed, instead we use values from the scoping study for application NBI in TCV: http://www.sciencedirect.com/science/article/pii/S092037961100247X.

6.1.3.1.2 NBI configurations available in the HCD-database

Machine	Configuration name	Description
ITER	default	From the EDRG machine description database. Details: Unit 1 is On-axis and Unit 2 is Off-axis. Two gaussian components are assumed for the divergence : core (5mrad) and halo (15mrad). Unit R,Z,Phi calculated from avg of x,y,z coord. from datafiles of Otto. Tang_rad and angles from avg over beamlets angles. Beam divergences set to 5mrad assuming ideal core only component (halo 15mrad neglected). Past revisions of RUN2 contained 16 nbi units since we literally took the 4x4 layout of the cross section as with individual units. But there is a single power line and as such it is a single unit. Next datastructures should allow us to have type array to store arbitrary lenght r,z,phi,tang_rad,angle to describe any sort of layout in a coarse fashion. (2013)
JET	default	From the EDRG machine description database. Details: This file is valid for so-called UP1467 configuration (PINIs 1-4-6-7 of both Octants are upshifted with respect to their standard position). Excluding some few restart (duct conditioning) shots at the beginning of experiment campaigns (which should not be analysed anyway), this configuration is valid for the shotrange 52888-61931. The order of entries below is as follows: First Octant 4 PINI-1, PINI-2, ... PINI-8, then Octant 8 PINI-1, PINI-2, ..., PINI-8. For pow_frc_blt (fraction of power of a unit injected by a beamlet) it is assumed for the moment that all beamlets inject the same amount of power. (2013)
AUG	default	From the EDRG machine description database (2013). Details: This file does not contain details on the beamlets on each unit. We will have to get those later on.

6.1.3.2 The EC settings panel

The EC settings panel is the list of variables following the line
`===== EC SETTINGS =====`

Here is a description of the variables in this panel.

- **EC_use_panel_settings:** If `TRUE` : use the EC settings panel to configure the EC system. If `FALSE` : ignore the EC settings panel and use the input CPO.
- **EC_machine_descriptions** : Select from where the EC hardware description should be taken:

  1. `from_input_CPO` : use the EC-configuration in the CPO provided by UAL-init;
  2. `from_HCD_database` : use the a HCD-database entry for the tokamak being simulated;
  3. `from_codeparameters` : specify the EC settings in the codeparamters of the actor addECant). For all three options, dynamic quantities like power, alpha, beta etc. are always set according to the NBI panel settings.

- **EC_configuration** : When using EC data from `EC_machine_descriptions=from_HCD_database` , then this parameter allow you to select different configurations: either you use the `default` or a `selected` configuration. In the latter case the name of the configuration is specified in **EC_configuration_name** .
- **EC_configuration_name** : When `EC_machine_descriptions=from_HCD_database` and `EC_configuration=selected` , then this parameter allow you to specify the name of your EC configuration. The name is provided as a string and has to be one of the configurations in the IMP5 EC-Antennas Database (6.1.3.2.3). Note that the configuration is tied to the machine you are simulating, e.g. only ITER configurations can be used when simulating the ITER tokamak.
- **EC_power_in** : power (W)
- **EC_angle_alpha_in** : Poloidal launching angle between the horizontal plane and the poloidal component of the nominal beam centerline (rad). Relation for to the component of the wave vector k: `tan(alpha)=-k_z/k_R`
- **EC_angle_beta_in** : Toroidal launching angle between the poloidal plane and the nominal beam centerline (rad). Relation for to the component of the wave vector k: `sin(beta)=k_phi/|k|`

6.1.3.2.1 Common EC settings

Machine	EC_power_in	EC_angle_alpha_in (stearable range)	EC_angle_beta_in (stearable range)
AUG (*/EC_1, */EC_2, */EC_3, */EC_4)	0.4 MW	(-4.3633231E-01 , 4.3633231E-01) rad	(-4.3633231E-01 , 4.3633231E-01) rad
AUG (*/EC_5, */EC_6, */EC_7, */EC_8)	0.7 MW	(-4.3633231E-01 , 4.3633231E-01) rad	(-4.3633231E-01 , 4.3633231E-01) rad
DEMO1	40 MW	- rad	- rad
ITER (2009/UL_LSM)	16 MW	(5.2359878E-01 , 9.5993109E-01) rad	(3.1415927E-01 , 3.1415927E-01) rad
ITER (2009/UL_USM)	16 MW	(6.1086524E-01 , 1.0471976E+00) rad	(3.4906585E-01 , 3.4906585E-01) rad
ITER (2011/EL_BOT)	8 MW	(-8.7266463E-02 , -8.7266463E-02) rad	(3.4906585E-01 , 6.9813170E-01) rad
ITER (2011/EL_MID)	8 MW	(0.0000000E+00 , 0.0000000E+00) rad	(-6.9813170E-01 , -3.4906585E-01) rad
ITER (2011/EL_TOP)	8 MW	(8.7266463E-02 , 8.7266463E-02) rad	(3.4906585E-01 , 6.9813170E-01) rad
ITER (2012/UL_LSM)	16 MW	(5.2359878E-01 , 9.5993109E-01) rad	(3.4906585E-01 , 3.4906585E-01) rad
ITER (2012/UL_USM)	16 MW	(6.1086524E-01 , 1.0471976E+00) rad	(3.4906585E-01 , 3.4906585E-01) rad
ITER (2013/EL_BOT)	8 MW	(-1.7453293E-01 , 4.3633231E-01 rad	(4.3633231E-01 , 4.3633231E-01 rad
ITER (2013/EL_MID)	8 MW	(0.0000000E+00 , 6.1086524E-01) rad	(4.3633231E-01 , 4.3633231E-01) rad
ITER (2013/EL_TOP)	16 Mw	(-3.4906585E-01 , 2.6179939E-01) rad	(-3.4906585E-01 , -3.4906585E-01) rad
JET	10 Mw	- rad	- rad

6.1.3.2.2 EC configuration available in the HCD-database

Machine	Configuration name	Description
AUG	LLLL	Official AUG antenna configuration #1 .Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=105 GHz, f(EC_7)=105 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.

Machine	Configuration name	Description
AUG	LLLH	Official AUG antenna configuration #2. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=105 GHz, f(EC_7)=105 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	LLHL	Official AUG antenna configuration #3. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=105 GHz, f(EC_7)=140 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	LLHH	Official AUG antenna configuration #4. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=105 GHz, f(EC_7)=140 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	LHLL	Official AUG antenna configuration #5. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=140 GHz, f(EC_7)=105 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	LHLH	Official AUG antenna configuration #6. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=140 GHz, f(EC_7)=105 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	LHHL	Official AUG antenna configuration #7. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=140 GHz, f(EC_7)=140 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	LHHH	Official AUG antenna configuration #8. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=105 GHz, f(EC_6)=140 GHz, f(EC_7)=140 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HLLL	Official AUG antenna configuration #9. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=105 GHz, f(EC_7)=105 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HLLH	Official AUG antenna configuration #10. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=105 GHz, f(EC_7)=105 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HLHL	Official AUG antenna configuration #11. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=105 GHz, f(EC_7)=140 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HLHH	Official AUG antenna configuration #12. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=105 GHz, f(EC_7)=140 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HHLL	Official AUG antenna configuration #13. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=140 GHz, f(EC_7)=105 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HHLH	Official AUG antenna configuration #14. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=140 GHz, f(EC_7)=105 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HHHL	Official AUG antenna configuration #15. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=140 GHz, f(EC_7)=140 GHz, f(EC_8)=105 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
AUG	HHHH	Official AUG antenna configuration #16. Provided by Joerg Stober and Walter Kasparek. Gyrotrons configuration: f(EC_5)=140 GHz, f(EC_6)=140 GHz, f(EC_7)=140 GHz, f(EC_8)=140 GHz. NOTE: Anyone who wants to use the ITM database to plan EC experiments on AUG should get in contact with Joerg Stober, to check that the assumptions they have done are consistent.
DEMO1	test200GHz	Dummy antenna; perpendicular launch in the equitorial plane at 200 GHz. Generated only for initial testing.
ITER	2009	Unofficial antenna (from Lorenzo Figini).
ITER	2011	Unofficial antenna (from Lorenzo Figini).
ITER	2012	Unofficial antenna (from Lorenzo Figini).
ITER	2013	Unofficial antenna (from Lorenzo Figini).

Machine	Configuration name	Description
JET	test66GHz	Dummy antenna; perpendicular launch in the equitorial plane at 66 GHz. Generated only for initial testing.
JET	test78GHz	Dummy antenna; perpendicular launch in the equitorial plane at 78 GHz. Generated only for initial testing.
JET	test90GHz	Dummy antenna; perpendicular launch in the equitorial plane at 90 GHz. Generated only for initial testing.

For a detailed description of these configurations, see the IMP5 EC-Antennas Database (6.1.3.2.3)

6.1.3.2.3 EC Antenna Database

UNDER CONSTRUCTION

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

6.1.3.2.4 AUG antennas

6.1.3.2.5 AUG configuration: HHHH

Antenna name: AUG/HHHH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }

- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHH/EC_5_140

- UALshot = 1
- UALrun = 10

- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHH/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHH/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }

- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHH/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.6 AUG configuration: HHHL

Antenna name: AUG/HHHL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00

- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHL/EC_5_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHL/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }

- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHL/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHHL/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.7 AUG configuration: HHLH

Antenna name: AUG/HHLH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05

- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLH/EC_5_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00

- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLH/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLH/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLH/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11

- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.8 AUG configuration: HHLL

Antenna name: AUG/HHLL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }

- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLL/EC_5_105

- UALshot = 1
- UALrun = 10

- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLL/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLL/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }

- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HHLL/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.9 AUG configuration: HLHH

Antenna name: AUG/HLHH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00

- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHH/EC_5_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHH/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }

- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHH/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHH/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.10 AUG configuration: HLHL

Antenna name: AUG/HLHL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05

- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHL/EC_5_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00

- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHL/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHL/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLHL/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11

- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.11 AUG configuration: HLLH

Antenna name: AUG/HLLH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }

- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLH/EC_5_140

- UALshot = 1
- UALrun = 10

- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLH/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLH/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }

- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLH/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.12 AUG configuration: HLLL

Antenna name: AUG/HLLL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00

- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLL/EC_5_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLL/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }

- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLL/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/HLLL/EC_8_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.13 AUG configuration: LHHH

Antenna name: AUG/LHHH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05

- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHH/EC_5_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00

- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHH/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHH/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHH/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11

- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.14 AUG configuration: LHHL

Antenna name: AUG/LHHL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }

- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHL/EC_5_105

- UALshot = 1
- UALrun = 10

- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHL/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHL/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }

- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHHL/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.15 AUG configuration: LHLH

Antenna name: AUG/LHLH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00

- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLH/EC_5_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLH/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }

- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLH/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLH/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.16 AUG configuration: LHLL

Antenna name: AUG/LHLL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05

- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLL/EC_5_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00

- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLL/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLL/EC_7_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LHLL/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11

- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.17 AUG configuration: LLHH

Antenna name: AUG/LLHH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }

- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHH/EC_5_140

- UALshot = 1
- UALrun = 10

- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHH/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHH/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }

- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHH/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.18 AUG configuration: LLHL

Antenna name: AUG/LLHL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00

- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHL/EC_5_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHL/EC_6_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }

- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHL/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLHL/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.19 AUG configuration: LLLH

Antenna name: AUG/LLLH/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLH/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLH/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05

- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLH/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLH/EC_5_140

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 4
- frequency = 1.4000000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00

- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLH/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLH/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLH/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11

- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.20 AUG configuration: LLLL

Antenna name: AUG/LLLL/EC_1

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 0
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLL/EC_2

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 1
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3800000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }

- spot.size = { 3.6400000E-02 , 3.6400000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -8.7930000E-01 , -8.7930000E-01 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLL/EC_3

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 2
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLL/EC_4

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 3
- frequency = 1.4000000E+11
- max_power = 4.0000000E+05
- R = 2.3110000E+00
- Z = 0.0000000E+00
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 3.2900000E-02 , 3.2900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -2.9660000E+00 , -2.9660000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLL/EC_5_105

- UALshot = 1
- UALrun = 10

- UALAntennaIndex = 4
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLL/EC_6_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 5
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = 3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLL/EC_7_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 6
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }

- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

Antenna name: AUG/LLLL/EC_8_105

- UALshot = 1
- UALrun = 10
- UALAntennaIndex = 7
- frequency = 1.0500000E+11
- max_power = 7.0000000E+05
- R = 2.3610000E+00
- Z = -3.2000000E-01
- phi = 0.0000000E+00
- alpha = { -4.3633231E-01 , 4.3633231E-01 }
- beta = { -4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 2.9900000E-02 , 2.9900000E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -1.1480000E+00 , -1.1480000E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.21 DEMO1 antennas

6.1.3.2.22 DEMO1 configuration: test200GHz

Antenna name: DEMO1/test200GHz/A

- UALshot = 1
- UALrun = 9
- UALAntennaIndex = 0
- frequency = 200.0000E+9
- max_power = 2.0000000E+07
- R = 13.000000E+00
- Z = 0.00000E+00
- phi = 0.0000000E+00
- alpha = { -1.0000000E0 , 1.0000000E+00 }
- beta = { -5.000000E-01 , 5.0000000E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.23 ITER antennas

6.1.3.2.24 ITER configuration: 2009

Antenna name: ITER/2009/UL_LSM

- UALshot = 1
- UALrun = 2
- UALAntennaIndex = 0
- frequency = 1.7000000E+11
- max_power = 1.6000000E+07
- R = 6.9200000E+00
- Z = 4.1550000E+00
- phi = 0.0000000E+00
- alpha = { 5.2359878E-01 , 9.5993109E-01 }
- beta = { 3.1415927E-01 , 3.1415927E-01 }
- spot.size = { 4.8126362E-02 , 4.8126362E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -4.9975158E-01 , -4.9975158E-01 }
- phase.angle = 0.0000000E+00

Antenna name: ITER/2009/UL_USM

- UALshot = 1
- UALrun = 2
- UALAntennaIndex = 1
- frequency = 1.7000000E+11
- max_power = 1.6000000E+07
- R = 6.8650000E+00
- Z = 4.3600000E+00
- phi = 0.0000000E+00
- alpha = { 6.1086524E-01 , 1.0471976E+00 }
- beta = { 3.4906585E-01 , 3.4906585E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.25 ITER configuration: 2011

Antenna name: ITER/2011/EL_BOT

- UALshot = 1
- UALrun = 1
- UALAntennaIndex = 0
- frequency = 1.7000000E+11
- max_power = 8.0000000E+06
- R = 9.2650000E+00
- Z = 1.2200000E+00
- phi = 0.0000000E+00
- alpha = { -8.7266463E-02 , -8.7266463E-02 }
- beta = { 3.4906585E-01 , 6.9813170E-01 }
- spot.size = { 1.0256697E-01 , 3.9357439E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { 1.2462495E-01 , -1.3519288E+00 }
- phase.angle = 0.0000000E+00

Antenna name: ITER/2011/EL_MID

- UALshot = 1
- UALrun = 1
- UALAntennaIndex = 1
- frequency = 1.7000000E+11
- max_power = 8.0000000E+06
- R = 9.2650000E+00
- Z = 6.2000000E-01
- phi = 0.0000000E+00
- alpha = { 0.0000000E+00 , 0.0000000E+00 }
- beta = { -6.9813170E-01 , -3.4906585E-01 }
- spot.size = { 1.0256697E-01 , 3.9357439E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { 1.2462495E-01 , -1.3519288E+00 }
- phase.angle = 0.0000000E+00

Antenna name: ITER/2011/EL_TOP

- UALshot = 1
- UALrun = 1
- UALAntennaIndex = 2
- frequency = 1.7000000E+11
- max_power = 8.0000000E+06

- R = 9.2650000E+00
- Z = 2.0000000E-02
- phi = 0.0000000E+00
- alpha = { 8.7266463E-02 , 8.7266463E-02 }
- beta = { 3.4906585E-01 , 6.9813170E-01 }
- spot.size = { 1.0256697E-01 , 3.9357439E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { 1.2462495E-01 , -1.3519288E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.26 ITER configuration: 2012

Antenna name: ITER/2012/UL_LSM

- UALshot = 1
- UALrun = 3
- UALAntennaIndex = 0
- frequency = 1.7000000E+11
- max_power = 1.6000000E+07
- R = 7.0600000E+00
- Z = 4.2300000E+00
- phi = 0.0000000E+00
- alpha = { 5.2359878E-01 , 9.5993109E-01 }
- beta = { 3.4906585E-01 , 3.4906585E-01 }
- spot.size = { 4.8126362E-02 , 4.8126362E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -4.9975158E-01 , -4.9975158E-01 }
- phase.angle = 0.0000000E+00

Antenna name: ITER/2012/UL_USM

- UALshot = 1
- UALrun = 3
- UALAntennaIndex = 1
- frequency = 1.7000000E+11
- max_power = 1.6000000E+07
- R = 7.0050000E+00
- Z = 4.4350000E+00
- phi = 0.0000000E+00
- alpha = { 6.1086524E-01 , 1.0471976E+00 }
- beta = { 3.4906585E-01 , 3.4906585E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.27 ITER configuration: 2013

Antenna name: ITER/2013/EL_BOT

- UALshot = 1
- UALrun = 4
- UALAntennaIndex = 0
- frequency = 1.7000000E+11
- max_power = 8.0000000E+06
- R = 9.2650000E+00
- Z = 1.2200000E+00
- phi = 0.0000000E+00
- alpha = { -1.7453293E-01 , 4.3633231E-01 }
- beta = { 4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 1.0256697E-01 , 3.9357439E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { 1.2462495E-01 , -1.3519288E+00 }
- phase.angle = 0.0000000E+00

Antenna name: ITER/2013/EL_MID

- UALshot = 1
- UALrun = 4
- UALAntennaIndex = 1
- frequency = 1.7000000E+11
- max_power = 8.0000000E+06
- R = 9.2650000E+00
- Z = 6.2000000E-01
- phi = 0.0000000E+00
- alpha = { 0.0000000E+00 , 6.1086524E-01 }
- beta = { 4.3633231E-01 , 4.3633231E-01 }
- spot.size = { 1.0256697E-01 , 3.9357439E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { 1.2462495E-01 , -1.3519288E+00 }
- phase.angle = 0.0000000E+00

Antenna name: ITER/2013/EL_TOP

- UALshot = 1
- UALrun = 4
- UALAntennaIndex = 2
- frequency = 1.7000000E+11
- max_power = 8.0000000E+06

- R = 9.2650000E+00
- Z = 2.0000000E-02
- phi = 0.0000000E+00
- alpha = { -3.4906585E-01 , 2.6179939E-01 }
- beta = { -3.4906585E-01 , -3.4906585E-01 }
- spot.size = { 1.0256697E-01 , 3.9357439E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { 1.2462495E-01 , -1.3519288E+00 }
- phase.angle = 0.0000000E+00

6.1.3.2.28 JET antennas

6.1.3.2.29 JET configuration: test132GHz

Antenna name: JET/test132GHz/A

- UALshot = 1
- UALrun = 6
- UALAntennaIndex = 0
- frequency = 132.0000E+9
- max_power = 2.0000000E+07
- R = 7.0050000E+00
- Z = 0.00000E+00
- phi = 0.0000000E+00
- alpha = { -1.0000000E0 , 1.0000000E+00 }
- beta = { -5.000000E-01 , 5.0000000E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.30 JET configuration: test156GHz

Antenna name: JET/test156GHz/A

- UALshot = 1
- UALrun = 7
- UALAntennaIndex = 0
- frequency = 156.0000E+9
- max_power = 2.0000000E+07
- R = 7.0050000E+00
- Z = 0.00000E+00
- phi = 0.0000000E+00

- alpha = { -1.0000000E0 , 1.0000000E+00 }
- beta = { -5.000000E-01 , 5.0000000E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.31 JET configuration: test180GHz

Antenna name: JET/test180GHz/A

- UALshot = 1
- UALrun = 8
- UALAntennaIndex = 0
- frequency = 180.0000E+9
- max_power = 2.0000000E+07
- R = 7.0050000E+00
- Z = 0.00000E+00
- phi = 0.0000000E+00
- alpha = { -1.0000000E0 , 1.0000000E+00 }
- beta = { -5.000000E-01 , 5.0000000E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.32 JET configuration: test66GHz

Antenna name: JET/test66GHz/A

- UALshot = 1
- UALrun = 5
- UALAntennaIndex = 0
- frequency = 66.00000E+9
- max_power = 2.0000000E+07
- R = 7.0050000E+00
- Z = 0.00000E+00
- phi = 0.0000000E+00
- alpha = { -1.0000000E0 , 1.0000000E+00 }
- beta = { -5.000000E-01 , 5.0000000E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.33 JET configuration: test78GHz

Antenna name: JET/test78GHz/A

- UALshot = 1
- UALrun = 6
- UALAntennaIndex = 0
- frequency = 78.00000E+9
- max_power = 2.0000000E+07
- R = 7.0050000E+00
- Z = 0.00000E+00
- phi = 0.0000000E+00
- alpha = { -1.0000000E0 , 1.0000000E+00 }
- beta = { -5.000000E-01 , 5.0000000E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.2.34 JET configuration: test90GHz

Antenna name: JET/test90GHz/A

- UALshot = 1
- UALrun = 7
- UALAntennaIndex = 0
- frequency = 90.00000E+9
- max_power = 2.0000000E+07
- R = 7.0050000E+00
- Z = 0.00000E+00
- phi = 0.0000000E+00
- alpha = { -1.0000000E0 , 1.0000000E+00 }
- beta = { -5.000000E-01 , 5.0000000E-01 }
- spot.size = { 5.0470054E-02 , 5.0470054E-02 }
- spot.angle = 0.0000000E+00
- invcurvrad = { -3.1388799E-01 , -3.1388799E-01 }
- phase.angle = 0.0000000E+00

6.1.3.3 The IC settings panel

The IC settings panel is the list of variables following the line
`===== IC SETTINGS =====`
Here is a description of the variables in this panel.

- **IC_use_panel_settings** : If `TRUE` : use the IC settings panel to configure the IC system. If `FALSE` : ignore the IC settings panel and use the input CPO.
- **IC_machine_descriptions** : Select from where the IC hardware description should be taken
  1. `from_input_CPO` : use the IC hardware in the CPO provided by the UAL;
  2. `from_HCD_database` : use the a HCD-database entry for the tokamak being simulated;
  3. `from_codeparameters` : specify the IC settings in the codeparamters of the actor addICant.

  For all three options, dynamic quantities like power, frequency etc. are always set according to the IC panel settings.
- **IC_configuration** : When using IC data from `IC_machine_descriptions=from_HCD_database` , then this parameter allow you to select different configurations: either you use the `default` or a `selected` configuration. In the latter case the name of the configuration is specified in **IC_configuration_name** .
- **IC_configuration_name** : When `IC_machine_descriptions=from_HCD_database` and `IC_configuration=selected` , then this parameter allow you to specify the name of your IC configuration. The name is provided as a string and has to be one of the configurations in the list of IC configurations (6.1.3.3.2) (for details see IMP5 IC-Antennas Database (6.1.3.3.3)). Note that the configuration is tied to the machine you are simulating, e.g. only ITER configurations can be used when simulating the ITER tokamak.
- **IC_power_in** : power (W)
- **IC_frequency_in** : frequency (Hz)
- **IC_phase_in** : phase of the current in each antenna strap (rad). Vector over all straps. E.g. a dipole phasing for a four strap antenna (JET-A2/ITER) may written as `{0,PI,0,PI}` , while a current drive phasing would be written as `{0,PI/2,PI,3*PI/2}` or `{0,-PI/2,-PI,-3*PI/2}` .

6.1.3.3.1 Common IC settings

Machine	IC_power_in	IC_frequency_in	IC_phase_in
ITER	20 MW	54 MHz (central He3 minority at 5.3T)	{ 0 , PI , 0 , PI }
JET	7 MW	33 MHz (central H minority at 2.16T) 37 MHz (central H minority at 2.42T) 42 MHz (central H minority at 2.75T) 47 MHz (central H minority at 3.08T) 51 MHz (central H minority at 3.34T) 33 MHz (central He3 minority at 3.24T) 37 MHz (central He3 minority at 3.63T) 51 MHz (central 2nd harmonic H at 1.67T) 47 MHz (central 2nd harmonic H at 1.54T) 42 MHz (central 2nd harmonic H at 1.38T) 37 MHz (central 2nd harmonic H at 1.21T) 33 MHz (central 2nd harmonic H at 1.08T)	{ 0 , PI , 0 , PI } (dipole) { 0 , PI/2 , PI , 3*PI/2 } (co-current) { 0 , -PI/2 , -PI , -3*PI/2 } (counter-current)
AUG	7 MW	30.0 MHz (central H minority at 2.0 T) 36.5 MHz (central H minority at 2.5 T)	{ 0 , PI }
Tore Supra	9 MW	57 MHz (central H minority at 3.7 T) 63 MHz (central 2nd harmonic H at 2.1 T) 42 MHz (central 3He minority at 3.7 T) 48 MHz (FWEH at 2.1 T)	{ 0 , PI }
WEST (unofficial 2013-08-08)	- MW	55/57 MHz (central H minority at 3.7 T)	

6.1.3.3.2 IC configurations available in the HCD-database

Names of available IC configuration in the machine description database:

Machine	Configuration name	Description
ITER	IC20130809rough	A rough unofficial antenna generated to mimic graphical illustrations.
JET	IC20130809rough	A rough unofficial antenna generated to mimic graphical illustrations.
AUG	IC20130809rough	A rough unofficial antenna generated from a limited number of parameter provided by Roberto Bilato.
WEST	FluxAligned	A rough unofficial antenna. The antenna shape is simply aligned to the flux surface, which is the same antenna that Remi Dumont has been using in his initial studies of ICRF in WEST (2013-10-16).

For detailed descriptions of these antennas see the IMP5 IC-Antennas Database (6.1.3.3.3)

6.1.3.3.3 IC Antenna Database

UNDER CONSTRUCTION

This documentation is generated from the XML schema, the xsd-file, for the code parameters.

6.1.3.3.4 AUG antennas

6.1.3.3.5 AUG configuration: IC20130809rough

Antenna name: AUG/IC20130809rough/A

- frequency = 36500000.0
- power = 2000000.0
- strap_dist2wall = 0.21
- strap_phase = { 0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.095 }
- strap_width = { 0.18 ,0.18 }
- strap_coord_R = { 2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 }
- strap_coord_Z = { -0.475 ,-0.38 ,-0.285 ,-0.19 ,-0.095 ,0.0 ,0.095 ,0.19 ,0.285 ,0.38 }

Antenna name: AUG/IC20130809rough/B

- frequency = 36500000.0
- power = 2000000.0
- strap_dist2wall = 0.21
- strap_phase = { 0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.095 }
- strap_width = { 0.18 ,0.18 }
- strap_coord_R = { 2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 }
- strap_coord_Z = { -0.475 ,-0.38 ,-0.285 ,-0.19 ,-0.095 ,0.0 ,0.095 ,0.19 ,0.285 ,0.38 }

Antenna name: AUG/IC20130809rough/C

- frequency = 36500000.0
- power = 2000000.0
- strap_dist2wall = 0.21
- strap_phase = { 0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.095 }
- strap_width = { 0.18 ,0.18 }

- strap_coord_R = { 2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 }
- strap_coord_Z = { -0.475 ,-0.38 ,-0.285 ,-0.19 ,-0.095 ,0.0 ,0.095 ,0.19 ,0.285 ,0.38 }

Antenna name: AUG/IC20130809rough/D

- frequency = 36500000.0
- power = 2000000.0
- strap_dist2wall = 0.21
- strap_phase = { 0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.095 }
- strap_width = { 0.18 ,0.18 }
- strap_coord_R = { 2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 ,2.2 }
- strap_coord_Z = { -0.475 ,-0.38 ,-0.285 ,-0.19 ,-0.095 ,0.0 ,0.095 ,0.19 ,0.285 ,0.38 }

6.1.3.3.6 ITER antennas

6.1.3.3.7 ITER configuration: IC20130809rough

Antenna name: ITER/IC20130809rough/A

- frequency = 54000000.0
- power = 20000000.0
- strap_dist2wall = 0.2
- strap_phase = { 0.0 ,3.14159265359 ,0.0 ,3.14159265359 }
- strap_phi_centre = { -0.0711221670188 ,0.0281434341884 ,0.0281434341884 ,0.0711221670188 }
- strap_width = { 0.213846466601 ,0.210159458556 ,0.210159458556 ,0.213846466601 }
- strap_coord_R = { 8.30444407765 ,8.30793901163 ,8.31139183153 ,8.31480251985 ,8.31817105931 ,8.32149743282 ,8.32478162353 ,8.32802361478 ,8.33122339015 ,8.33438093341 ,8.33749622856 ,8.3405692598 ,8.34360001156 ,8.34658846847 ,8.34953461539 ,8.35243843738 ,8.35529991971 ,8.3581190479 ,8.36089580764 ,8.36363018486 ,8.3663221657 ,8.3689717365 ,8.37157888386 ,8.37414359453 ,8.37666585553 ,8.37914565407 ,8.38158297758 ,8.3839778137 ,8.38633015029 ,8.38863997543 ,8.39090727742 ,8.39313204475 ,8.39531426615 ,8.39745393055 ,8.39955102712 ,8.40160554522 ,8.40361747444 ,8.40558680457 ,8.40751352563 ,8.40939762787 ,8.41123910172 ,8.41303793785 ,8.41479412715 ,8.41650766071 ,8.41817852984 ,8.41980672608 ,8.42139224117 ,8.42293506707 ,8.42443519597 ,8.42589262026 ,8.42730733255 ,8.42867932567 ,8.43000859266 ,8.43129512679 ,8.43253892154 ,8.4337399706 ,8.43489826788 ,8.43601380751 ,8.43708658383 ,8.43811659142 ,8.43910382504 ,8.44004827969 ,8.44080608265 ,8.43989744663 ,8.43894602763 ,8.43795183046 ,8.43691486016 ,8.43583512199 ,8.43471262142 ,8.43354736414 ,8.43233935606 ,8.43108860331 ,8.42979511221 ,8.42845888934 ,8.42707994145 ,8.42565827556 ,8.42419389884 ,8.42268681875 ,8.4211370429 ,8.41954457916 ,8.41790943561 ,8.41623162052 ,8.41451114241 ,8.41274800999 ,8.41094223221 ,8.40909381821 ,8.40720277737 ,8.40526911927 ,8.40329285372 ,8.40127399073 ,8.39921254054 ,8.39710851359 ,8.39496192056 ,8.39277277232 ,8.39054107997 ,8.38826685482 ,8.3859501084 ,8.38359085247 ,8.38118909896 ,8.37874486007 }
- strap_coord_Z = { 1.56163650097 ,1.54293531266 ,1.52422630301 ,1.50550956684 ,1.48678519904 ,1.46805329452 ,1.44931394824 ,1.43056725519 ,1.4118133104 ,1.39305220893 ,1.3742840459 ,1.35550891643 ,1.3367269157 ,1.31793813892 ,1.29914268133 ,1.28034063821 ,1.26153210487 ,1.24271717665 ,1.22389594893 ,1.20506851711 ,1.18623497664 ,1.16739542298 ,1.14854995163 ,1.12969865813 ,1.11084163803 ,1.09197898692 ,1.07311080042 ,1.05423717418 ,1.03535820386 ,1.01647398517 ,0.997584613841 ,0.978690185617 ,0.959790796278 ,0.940886541629 ,0.921977517498 ,0.903063819737 ,0.884145544222 ,0.865222786853 ,0.846295643552 ,0.827364210263 ,0.808428582951 ,0.789488857606 ,0.770545130233 ,0.751597496862 ,0.732646053541 ,0.713690896337 ,0.694732121337 ,0.675769824645 ,0.656804102383 ,0.637835050692 ,0.618862765728 ,0.599887343665 ,0.580908880691 ,0.56192747301 ,0.542943216842 ,0.523956208421 ,0.504966543995 ,0.485974319825 ,0.466979632184 ,0.44798257736 ,0.428983251651 ,0.409981751368 ,0.390978172831 ,0.371972612373 ,0.352965166334 ,0.333955931067 ,0.314945002932 ,0.295932478298 ,0.276918453542 ,0.257903025048 ,0.238886289209 ,0.219868342422 ,0.200849281093 ,0.181829201632 ,0.162808200453 ,0.143786373978

,0.12476381863 ,0.105740630837 ,0.0867169070302 ,0.0676927436438 ,0.0486682371136 ,0.0296434838774 ,0.010618580374 ,-0.0084063769556 ,-0.0274312916726 ,-0.0464560673366 ,-0.0654806075084 ,-0.0845048157502 ,-0.103528595625 ,-0.1225518507 ,-0.141574484543 ,-0.160596400725 ,-0.179617502823 ,-0.198637694414 ,-0.217656879084 ,-0.236674960422 ,-0.255691842022 ,-0.274707427485 ,-0.293721620419 ,-0.312734324438 }

6.1.3.3.8 JET antennas

6.1.3.3.9 JET configuration: IC20130809rough

Antenna name: JET/IC20130809rough/A

- frequency = 42000000.0
- power = 2000000.0
- strap_dist2wall = 0.275
- strap_phase = { 0.0 ,3.14159265359 ,0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.074025974026 ,0.14852 ,0.2188 }
- strap_width = { 0.18 ,0.18 ,0.18 ,0.18 }
- strap_coord_R = { 3.76779 ,3.766355 ,3.769994 ,3.778127 ,3.786546 ,3.794739 ,3.802773 ,3.810458 ,3.817928 ,3.825151 ,3.83214 ,3.83897 ,3.845452 ,3.85183 ,3.857891 ,3.863829 ,3.869432 ,3.874891 ,3.880056 ,3.885132 ,3.889887 ,3.894514 ,3.898886 ,3.903034 ,3.906955 ,3.910721 ,3.914315 ,3.917724 ,3.920936 ,3.923939 ,3.926724 ,3.929277 ,3.931589 ,3.933649 ,3.935444 ,3.937012 ,3.938565 ,3.939911 ,3.941071 ,3.942011 ,3.94278 ,3.943352 ,3.943644 ,3.943845 ,3.943845 ,3.94361 ,3.943168 ,3.942542 ,3.941718 ,3.940709 ,3.93955 ,3.938106 ,3.936547 ,3.934709 ,3.932708 ,3.930548 ,3.928138 ,3.925512 ,3.922774 ,3.919881 ,3.920381 }
- strap_coord_Z = { -0.55 ,-0.53 ,-0.51 ,-0.49 ,-0.47 ,-0.45 ,-0.43 ,-0.41 ,-0.39 ,-0.37 ,-0.35 ,-0.33 ,-0.31 ,-0.29 ,-0.27 ,-0.25 ,-0.23 ,-0.21 ,-0.19 ,-0.17 ,-0.15 ,-0.13 ,-0.11 ,-0.09 ,-0.07 ,-0.05 ,-0.03 ,-0.01 ,0.01 ,0.03 ,0.05 ,0.07 ,0.09 ,0.11 ,0.13 ,0.15 ,0.17 ,0.19 ,0.21 ,0.23 ,0.25 ,0.27 ,0.29 ,0.31 ,0.33 ,0.35 ,0.37 ,0.39 ,0.41 ,0.43 ,0.45 ,0.47 ,0.49 ,0.51 ,0.53 ,0.55 ,0.57 ,0.59 ,0.61 ,0.63 ,0.65 }

Antenna name: JET/IC20130809rough/B

- frequency = 42000000.0
- power = 2000000.0
- strap_dist2wall = 0.275
- strap_phase = { 0.0 ,3.14159265359 ,0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.074025974026 ,0.14852 ,0.2188 }
- strap_width = { 0.18 ,0.18 ,0.18 ,0.18 }
- strap_coord_R = { 3.76779 ,3.766355 ,3.769994 ,3.778127 ,3.786546 ,3.794739 ,3.802773 ,3.810458 ,3.817928 ,3.825151 ,3.83214 ,3.83897 ,3.845452 ,3.85183 ,3.857891 ,3.863829 ,3.869432 ,3.874891 ,3.880056 ,3.885132 ,3.889887 ,3.894514 ,3.898886 ,3.903034 ,3.906955 ,3.910721 ,3.914315 ,3.917724 ,3.920936 ,3.923939 ,3.926724 ,3.929277 ,3.931589 ,3.933649 ,3.935444 ,3.937012 ,3.938565 ,3.939911 ,3.941071 ,3.942011 ,3.94278 ,3.943352 ,3.943644 ,3.943845 ,3.943845 ,3.94361 ,3.943168 ,3.942542 ,3.941718 ,3.940709 ,3.93955 ,3.938106 ,3.936547 ,3.934709 ,3.932708 ,3.930548 ,3.928138 ,3.925512 ,3.922774 ,3.919881 ,3.920381 }
- strap_coord_Z = { -0.55 ,-0.53 ,-0.51 ,-0.49 ,-0.47 ,-0.45 ,-0.43 ,-0.41 ,-0.39 ,-0.37 ,-0.35 ,-0.33 ,-0.31 ,-0.29 ,-0.27 ,-0.25 ,-0.23 ,-0.21 ,-0.19 ,-0.17 ,-0.15 ,-0.13 ,-0.11 ,-0.09 ,-0.07 ,-0.05 ,-0.03 ,-0.01 ,0.01 ,0.03 ,0.05 ,0.07 ,0.09 ,0.11 ,0.13 ,0.15 ,0.17 ,0.19 ,0.21 ,0.23 ,0.25 ,0.27 ,0.29 ,0.31 ,0.33 ,0.35 ,0.37 ,0.39 ,0.41 ,0.43 ,0.45 ,0.47 ,0.49 ,0.51 ,0.53 ,0.55 ,0.57 ,0.59 ,0.61 ,0.63 ,0.65 }

Antenna name: JET/IC20130809rough/C

- frequency = 42000000.0
- power = 2000000.0
- strap_dist2wall = 0.275

- strap_phase = { 0.0 ,3.14159265359 ,0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.074025974026 ,0.14852 ,0.2188 }
- strap_width = { 0.18 ,0.18 ,0.18 ,0.18 }
- strap_coord_R = { 3.76779 ,3.766355 ,3.769994 ,3.778127 ,3.786546 ,3.794739 ,3.802773 ,3.810458 ,3.817928 ,3.825151 ,3.83214 ,3.83897 ,3.845452 ,3.85183 ,3.857891 ,3.863829 ,3.869432 ,3.874891 ,3.880056 ,3.885132 ,3.889887 ,3.894514 ,3.898886 ,3.903034 ,3.906955 ,3.910721 ,3.914315 ,3.917724 ,3.920936 ,3.923939 ,3.926724 ,3.929277 ,3.931589 ,3.933649 ,3.935444 ,3.937012 ,3.938565 ,3.939911 ,3.941071 ,3.942011 ,3.94278 ,3.943352 ,3.943644 ,3.943845 ,3.943845 ,3.94361 ,3.943168 ,3.942542 ,3.941718 ,3.940709 ,3.93955 ,3.938106 ,3.936547 ,3.934709 ,3.932708 ,3.930548 ,3.928138 ,3.925512 ,3.922774 ,3.919881 ,3.920381 }
- strap_coord_Z = { -0.55 ,-0.53 ,-0.51 ,-0.49 ,-0.47 ,-0.45 ,-0.43 ,-0.41 ,-0.39 ,-0.37 ,-0.35 ,-0.33 ,-0.31 ,-0.29 ,-0.27 ,-0.25 ,-0.23 ,-0.21 ,-0.19 ,-0.17 ,-0.15 ,-0.13 ,-0.11 ,-0.09 ,-0.07 ,-0.05 ,-0.03 ,-0.01 ,0.01 ,0.03 ,0.05 ,0.07 ,0.09 ,0.11 ,0.13 ,0.15 ,0.17 ,0.19 ,0.21 ,0.23 ,0.25 ,0.27 ,0.29 ,0.31 ,0.33 ,0.35 ,0.37 ,0.39 ,0.41 ,0.43 ,0.45 ,0.47 ,0.49 ,0.51 ,0.53 ,0.55 ,0.57 ,0.59 ,0.61 ,0.63 ,0.65 }

Antenna name: JET/IC20130809rough/D

- frequency = 42000000.0
- power = 2000000.0
- strap_dist2wall = 0.275
- strap_phase = { 0.0 ,3.14159265359 ,0.0 ,3.14159265359 }
- strap_phi_centre = { 0.0 ,0.074025974026 ,0.14852 ,0.2188 }
- strap_width = { 0.18 ,0.18 ,0.18 ,0.18 }
- strap_coord_R = { 3.76779 ,3.766355 ,3.769994 ,3.778127 ,3.786546 ,3.794739 ,3.802773 ,3.810458 ,3.817928 ,3.825151 ,3.83214 ,3.83897 ,3.845452 ,3.85183 ,3.857891 ,3.863829 ,3.869432 ,3.874891 ,3.880056 ,3.885132 ,3.889887 ,3.894514 ,3.898886 ,3.903034 ,3.906955 ,3.910721 ,3.914315 ,3.917724 ,3.920936 ,3.923939 ,3.926724 ,3.929277 ,3.931589 ,3.933649 ,3.935444 ,3.937012 ,3.938565 ,3.939911 ,3.941071 ,3.942011 ,3.94278 ,3.943352 ,3.943644 ,3.943845 ,3.943845 ,3.94361 ,3.943168 ,3.942542 ,3.941718 ,3.940709 ,3.93955 ,3.938106 ,3.936547 ,3.934709 ,3.932708 ,3.930548 ,3.928138 ,3.925512 ,3.922774 ,3.919881 ,3.920381 }
- strap_coord_Z = { -0.55 ,-0.53 ,-0.51 ,-0.49 ,-0.47 ,-0.45 ,-0.43 ,-0.41 ,-0.39 ,-0.37 ,-0.35 ,-0.33 ,-0.31 ,-0.29 ,-0.27 ,-0.25 ,-0.23 ,-0.21 ,-0.19 ,-0.17 ,-0.15 ,-0.13 ,-0.11 ,-0.09 ,-0.07 ,-0.05 ,-0.03 ,-0.01 ,0.01 ,0.03 ,0.05 ,0.07 ,0.09 ,0.11 ,0.13 ,0.15 ,0.17 ,0.19 ,0.21 ,0.23 ,0.25 ,0.27 ,0.29 ,0.31 ,0.33 ,0.35 ,0.37 ,0.39 ,0.41 ,0.43 ,0.45 ,0.47 ,0.49 ,0.51 ,0.53 ,0.55 ,0.57 ,0.59 ,0.61 ,0.63 ,0.65 }

6.1.3.3.10 WEST antennas

6.1.3.3.11 WEST configuration: FluxAligned

Antenna name: WEST/FluxAligned/A

- frequency = 55000000.0
- power = 2000000.0
- strap_dist2wall = 0.2
- strap_phase = { 0.0 ,3.14159265359 }
- strap_phi_centre = { -0.0717 ,0.0717 }
- strap_width = { 0.15 ,0.15 }
- strap_coord_R = { 2.786301 ,2.790518 ,2.795422 ,2.799577 ,2.804159 ,2.8086 ,2.812859 ,2.81711 ,2.821506 ,2.825241 ,2.82916 ,2.833509 ,2.837586 ,2.841331 ,2.845207 ,2.849113 ,2.852931 ,2.856141 ,2.859704 ,2.863633 ,2.867153 ,2.870422 ,2.874193 ,2.877257 ,2.880099 ,2.883392 ,2.886868 ,2.890081 ,2.892963 ,2.895972 ,2.898732 ,2.9019 ,2.904538 ,2.907243 ,2.909962 ,2.912708 ,2.915132 ,2.917706 ,2.920017 ,2.92276 ,2.924639 ,2.927066 ,2.929652 ,2.931908 ,2.933932 ,2.936084 ,2.938279 ,2.940253 ,2.942604 ,2.94428 ,2.946262 ,2.948096 ,2.949703 ,2.951423 ,2.952898 ,2.954747 ,2.95609 ,2.957418 ,2.959091 ,2.960514 ,2.961668 ,2.962987 ,2.964525 ,2.965461

,2.966922 ,2.967847 ,2.969235 ,2.970264 ,2.97122 ,2.972174 ,2.97299 ,2.973628 ,2.974487 ,2.975201 ,2.975538 ,2.976199 ,2.977051 ,2.977308 ,2.977995 ,2.97796 ,2.978355 ,2.978701 ,2.979041 ,2.97911 ,2.97911 ,2.979503 ,2.979979 ,2.980337 ,2.980689 ,2.980195 ,2.980642 ,2.980218 ,2.979801 ,2.979832 ,2.97954 ,2.979458 ,2.978798 ,2.97842 ,2.977585 ,2.977285 ,2.976898 ,2.975995 ,2.975382 ,2.97468 ,2.97417 ,2.972996 ,2.972345 ,2.971782 ,2.970737 ,2.969429 ,2.968362 ,2.966954 ,2.966233 ,2.964712 ,2.963387 ,2.962291 ,2.960589 ,2.959356 ,2.957756 ,2.955883 ,2.95421 ,2.952845 ,2.951258 ,2.948894 ,2.947223 ,2.945562 ,2.943561 ,2.941266 ,2.939614 ,2.93745 ,2.935182 ,2.933171 ,2.93057 ,2.928317 ,2.925883 ,2.923653 ,2.921004 ,2.917903 ,2.91515 ,2.912625 ,2.909802 ,2.906848 ,2.903922 ,2.900869 ,2.898088 ,2.894717 ,2.891516 ,2.888673 ,2.885438 ,2.882213 ,2.878746 ,2.875166 ,2.87156 ,2.868394 ,2.864322 ,2.860609 ,2.85667 ,2.85326 ,2.848973 ,2.84487 ,2.841027 ,2.837056 ,2.83304 ,2.828743 ,2.824301 ,2.819509 ,2.8155 }

- strap_coord_Z = { -0.443495 ,-0.438606 ,-0.433672 ,-0.428779 ,-0.423789 ,-0.418845 ,-0.413863 ,-0.408851 ,-0.403898 ,-0.398823 ,-0.393767 ,-0.388732 ,-0.383613 ,-0.378536 ,-0.373413 ,-0.368304 ,-0.363119 ,-0.357983 ,-0.352761 ,-0.347585 ,-0.342387 ,-0.337169 ,-0.331978 ,-0.326717 ,-0.321468 ,-0.316274 ,-0.310965 ,-0.305723 ,-0.300364 ,-0.295092 ,-0.289773 ,-0.284499 ,-0.279104 ,-0.273742 ,-0.268374 ,-0.263007 ,-0.257654 ,-0.252243 ,-0.246859 ,-0.241432 ,-0.23604 ,-0.230615 ,-0.22518 ,-0.219753 ,-0.214296 ,-0.20885 ,-0.203395 ,-0.197941 ,-0.192457 ,-0.186976 ,-0.181505 ,-0.176024 ,-0.170527 ,-0.16501 ,-0.159486 ,-0.153991 ,-0.148445 ,-0.142902 ,-0.137355 ,-0.131816 ,-0.126251 ,-0.120692 ,-0.115126 ,-0.109555 ,-0.103973 ,-0.098385 ,-0.092802 ,-0.087212 ,-0.081624 ,-0.076017 ,-0.070417 ,-0.06481 ,-0.059204 ,-0.053588 ,-0.047968 ,-0.042362 ,-0.036734 ,-0.031113 ,-0.025486 ,-0.019851 ,-0.014217 ,-0.008575 ,-0.002932 ,0.002713 ,0.002713 ,0.008368 ,0.014024 ,0.019693 ,0.025358 ,0.031025 ,0.036691 ,0.042363 ,0.048023 ,0.053687 ,0.059351 ,0.065018 ,0.070683 ,0.076352 ,0.082032 ,0.08771 ,0.09338 ,0.099057 ,0.104742 ,0.110424 ,0.116103 ,0.121781 ,0.127468 ,0.13315 ,0.138841 ,0.144547 ,0.150202 ,0.155893 ,0.161548 ,0.16723 ,0.172914 ,0.178611 ,0.184248 ,0.189903 ,0.195589 ,0.201252 ,0.206899 ,0.212533 ,0.218181 ,0.223833 ,0.229456 ,0.235102 ,0.240719 ,0.24632 ,0.251965 ,0.257603 ,0.263197 ,0.26879 ,0.27438 ,0.280026 ,0.285553 ,0.291139 ,0.296705 ,0.302209 ,0.307764 ,0.313296 ,0.31877 ,0.324298 ,0.329812 ,0.335316 ,0.340816 ,0.346323 ,0.351767 ,0.357221 ,0.362621 ,0.368082 ,0.373442 ,0.378786 ,0.384139 ,0.389503 ,0.394821 ,0.40005 ,0.405305 ,0.410555 ,0.415816 ,0.421041 ,0.426232 ,0.431457 ,0.436641 ,0.441754 ,0.446842 ,0.451912 ,0.457012 }

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last update: 2013-10-22 by tjohnson

6.1.3.4 The Wall settings panel

The Wall settings panel is the list of variables following the line
`===== WALL SETTINGS =====`
Here is a description of the variables in this panel.

- **WALL_use_panel_settings:** If `TRUE` : use the Wall settings panel to configure the wall properties. If `FALSE` : ignore the Wall settings panel and use the input CPO.
- **WALL_machine_descriptions** : Select from where the Wall description should be taken:

  1. `from_input_CPO` : use the WALL CPO provided by the UAL
  2. `from_HCD_database` : use the a HCD-database entry for the tokamak being simulated (see list of available database entries (6.1.3.4.1)).
  3. `from_codeparameters` : Under development.

6.1.3.4.1 WALL configurations available in the HCD-database

Machine	Configuration name	Description
ITER	default	from the EDRG machine description database (2013)
JET	default	from the EDRG machine description database (2013)
AUG	default	from the EDRG machine description database (2013)
FTU	default	from the EDRG machine description database (2013)

6.2 IMP5HCD - the IMP5 Composite Actor for Heating and Current Drive

Purpose	Contact persons	Input	Output
Kepler-actor [182] for integrated modelling of Heating and Current Drive (EC,LH,IC,NBI,alphas-heating)	Thomas Johnson Lorenzo Figini	EU-ITM Plasma bundle [183] Required CPOs are: `antennas`, `nbi`, `wall`, `equilibrium`, `coreprof`, `coreimpur` . Manual setting (Kepler variables) selecting codes, synergy options, and certain modelling parameters.	Subset of the EU-ITM Plasma bundle [184]containing the CPOs: `waves`, `distsource`, `distribution`, `coresource`

The IMP5 Composite Actor for Heating and Current Drive is a multi layered composite actor. Each layer separates one different groups of models or codes, e.g.

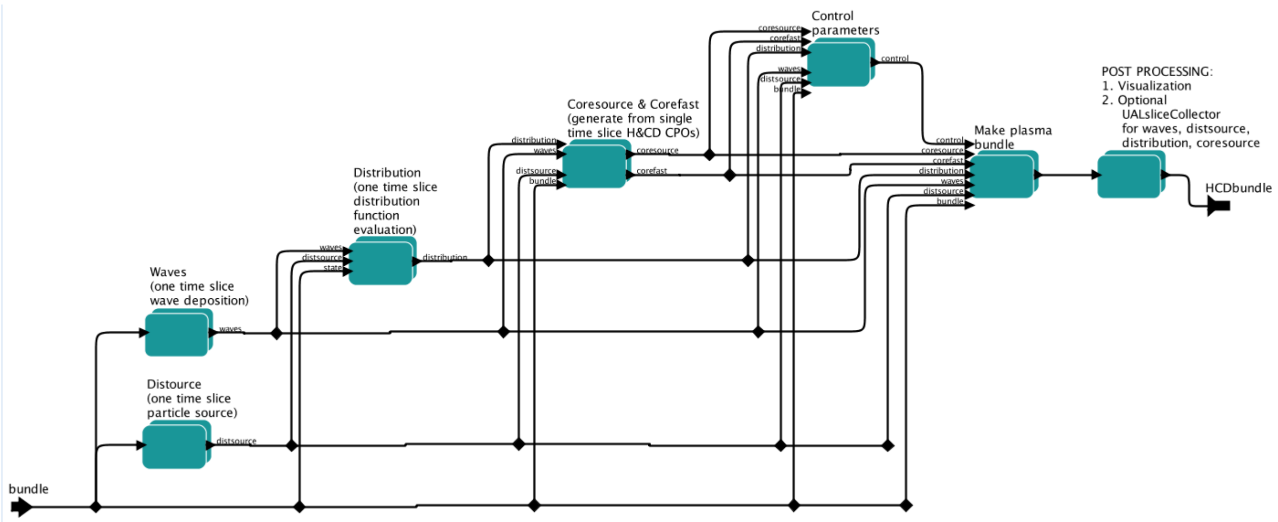
- the generation of CPOs (wave, distsource, distribution and coresource),
- the different heating schemes,
- ions and electrons solvers,
- ...all the way down to the level of Actors for physics models.

The composite actor takes as input the standardized EU-ITM Plasma bundle [185] and generates as output the CPOs `waves` , `distsource` , `distribution` and `coresouce` (bundled into a subset of the EU-ITM Plasma bundle).

The IMP5 Composite Actor for Heating and Current Drive is stored as part of the IMP5HCD-SA (6.1) workflow.

The IMP5HCD include a number physics codes. For a schort description of these codes and contact information, follow this link [186].

As an example we have below illustrations of some of the structure inside the composite actors for waves (6.2.4) and the composite actor for distribution (6.2.5).



6.2.1 Physics actors in IMP5HCD

Here follows a list of the heating and current drive actor released in the imp5hcd composite actor that have passed at least some elementary robustness tests and in most cases some form of verification. This list is likely to change within a few month time. For the latest details contact Thomas Johnson.

Date of last update: 2014-12-19

[182] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_actor
[183] https://www.efda-itm.eu/ITM/html/itm_conventions.html#itm_conventions_plasma_bundle
[184] https://www.efda-itm.eu/ITM/html/itm_conventions.html#itm_conventions_plasma_bundle
[185] https://www.efda-itm.eu/ITM/html/itm_conventions.html#itm_conventions_plasma_bundle
[186] https://www.efda-itm.eu/ITM/html/.html#imp5_workflow__physics_actors

Code name	Code Category	Contact persons	Short description
gray (4.1.1)	EC/waves	Lorenzo Figini	GRAY is a quasi-optical ray-tracing code for electron cyclotron heating & current drive calculations in tokamaks. Documentation of code parameters [187].
travis (4.1.1)	EC/waves	Nikolai Marushchenko	Travis is a ray-tracing code for electron cyclotron heating & current drive calculations in tokamaks.
Torray-FOM (4.1.1)	EC/waves	Egbert Westerhof	Torray-FOM is a ray-tracing code for electron cyclotron heating & current drive calculations in tokamaks.
bbnbi (4.2.3)	NBI/source	Otto Asunta	Calculate the deposition rates of neutrals beam particles, i.e. the input source for Fokker-Planck solvers (not the heating and current drive). Note that the number of markers generated by BBNBI is described by the kepler variable `number_nbi_markers_in` .
nemo (4.2.3)	NBI/source	Mireille Schneider	Calculate the deposition rates of neutrals beam particles, i.e. the input source for Fokker-Planck solvers (not the heating and current drive).
nuclearsim (4.2.4)	nuclear/source	Thomas Johnson	Simple code for nuclear sources from thermal/thermal reactions. Documentation of code parameters [188]
nbisim (4.2.5)	NBI+nuclear/Fokker-Planck	Thomas Johnson	Simple Fokker-Planck code calculating the collisional ion and electron heating from a particle source, either NBI or nuclear.
risk (4.2.5)	NBI Fokker-Planck	Mireille Schneider	Bounce averaged steady-state Fokker-Planck solver calculating the collisional ion and electron heating from a particle source and the NBI current drive.
spot (4.2.6)	NBI and ICRF Fokker-Planck	Mireille Schneider	Monte Carlo solver for the Fokker-Planck equation. Traces guiding centre orbits in a steady state magnetic equilibrium under the influence of Coloumb collisions and interactions with ICRF waves (through the RFOF library). The can also be used for NBI and alpha particle modelling as it can handle source terms from the distsource CPO.
ascot4serial (4.2.6)	NBI, alphas, ICRF / Fokker-Planck	Otto Asunta/Seppo Sipila	Monte Carlo Fokker-Planck solver calculating the collisional ion and electron heating from a particle source and the NBI current drive.
ascot4parallel (4.2.6)	NBI, alphas, ICRF / Fokker-Planck	Otto Asunta/Seppo Sipila	Monte Carlo Fokker-Planck solver calculating the collisional ion and electron heating from a particle source and the NBI current drive.
iccoup (4.2.1)	IC/coupling	Thomas Johnson	Simple model for the coupling waves from ion cyclotron antennas to the plasma.
LION	IC / waves	Olivier Sauter and Laurent Villard	Global ICRF wave solver
Cyrano	IC / waves	Ernesto Lerche and Dirk Van Eester	Global ICRF wave solver
Eve	IC / waves	Remi Dumont	Global ICRF wave solver
StixReDist	IC / waves	Dirk Van Eester and Ernesto Lerche	1d Fokker-Planck solver for ICRF heating.
ICDEP	IC / waves	Thomas Johnson	Generates Waves-cpo with an IC wave field with Gaussian deposition profiles described by a combination of antenna-cpo input and through code parameters input (see documentation of code parameters [189])

6.2.2 Non-physics actors in IMP5HCD

UNDER DEVELOPMENTS

Code name	Code Category	Contact persons	Short description
addECant	Antennas / generator	Thomas Johnson/Lorenzo Figini	Appends EC setting to an Antennas-cpo. The settings are provided as a combination of Kepler-input (for power and launching angles) and machine parameters that are hard-coded for each tokamak. In case the EC system of a tokamak is not implemented it uses the code-parameters from the writeECant actor (see documentation of code parameters [190])
addICant	Antennas / generator	Thomas Johnson	Appends IC setting to an Antennas-cpo. The settings are provided as a combination of Kepler-input, including the power, frequency and phasing. In case the IC machine parameters are not available in the input CPO, then these are filled with hardcoded parameters for a given tokamak.
nbifiller	NBI / generator	Thomas Johnson	Updates the time dependent NBI setting to an NBI-cpo. The settings are provided as a combination of Kepler-input, including the mass, charge, power, injection energy and the beam-power-fractions. In case the IC machine parameters are not available in the input CPO, then these are filled with hardcoded parameters for a given tokamak.
hcd2coresource	coresource-CPO / data-joiner	Thomas Johnson	Generates a Coresource-cpo from input Distsource, Waves and Distribution cpos.
waves2source	coresource-CPO / data-joiner	Lorenzo Figini	Generates a Coresource-cpo from input Waves cpo.

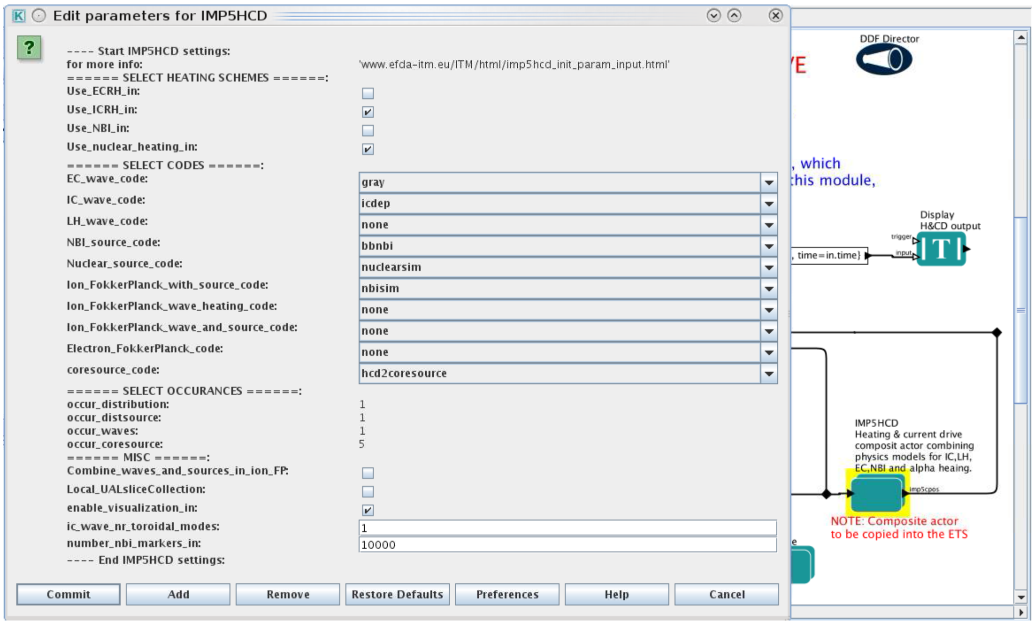
[187] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_gray.html
[188] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_nuclearsim.html
[189] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_icdep.html
[190] https://www.efda-itm.eu/ITM/html/imp5_code_parameter_documentation_writeECant.html

Code name	Code Category	Contact persons	Short description
hcd2corefast	coresource-CPO / data-joiner	Thomas Johnson	Generates a Corefast-cpo from the input Distribution cpo.
emptywaves	waves-CPO / generator	Thomas Johnson	Generates an empty Waves cpo.
emptydistsource	distsource-CPO / generator	Thomas Johnson	Generates an empty Distsource cpo.
emptydistribution	distribution-CPO / generator	Thomas Johnson	Generates an empty Distribution cpo.
emptycoresource	coresource-CPO / generator	Thomas Johnson	Generates an empty Coresource cpo.
emptycorefast	corefast-CPO / generator	Thomas Johnson	Generates an empty Corefast cpo.
merge4waves	waves-CPO / merger	Thomas Johnson	Mergers two Waves cpos.
merge4distsource	distsource-CPO / merger	Thomas Johnson	Mergers two Distsource cpos.
merge4distribution	distribution-CPO / merger	Thomas Johnson	Mergers two Distribution cpos.

6.2.3 Parameter input to IMP5HCD

UNDER CONSTRUCTION

Running IMP5HCD there are a number of workflow setting to consider.



6.2.3.1 Select Heating Schemes

These setting allow the user to turn on or off heating schemes.

6.2.3.2 Select Codes

Here the physics codes of different categories can be selected. More information about the codes one can choose from can be found here (4).

NOTE: Some codes that appear in the drop down menues may not yet be running with the latest version of the UAL, thus check the list of physics actors available in IMP5HCD (6.2.1).

NOTE: The codes selected here are only run if the corresponding heating scheme is selected in Select Heating Schemes (6.2.3.1). What codes are used also depends on setting in Misc (6.2.3.2), e.g. the variable `Combine_waves_and_source` will switch between running the different ion Fokker-Planck codes:

- when `Combine_waves_and_sources_in_ion_FP=TRUE` , then the Fokker-Planck solver is selected from `Ion_FokkerPlanc`
- when `Combine_waves_and_sources_in_ion_FP=FALSE` , then the Fokker-Planck solver is selected from `Ion_FokkerPlanck_with_source_code` and `Ion_FokkerPlanck_wave_heating_code` .

6.2.3.3 Select Occurrences

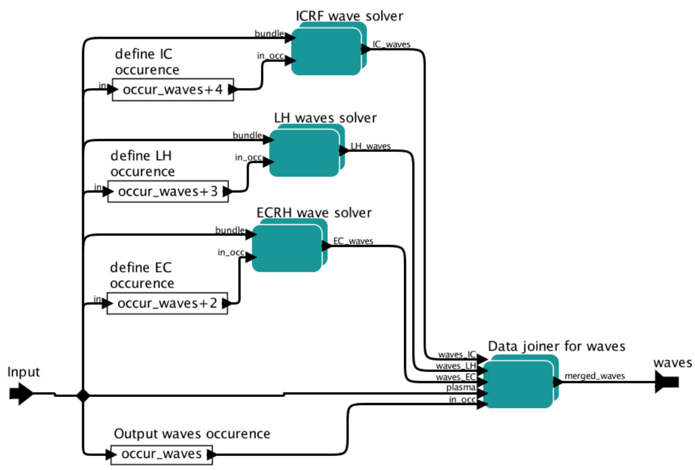
Selecting the first in s series of occurrence numbers. For advanced users only.

6.2.3.4 Misc

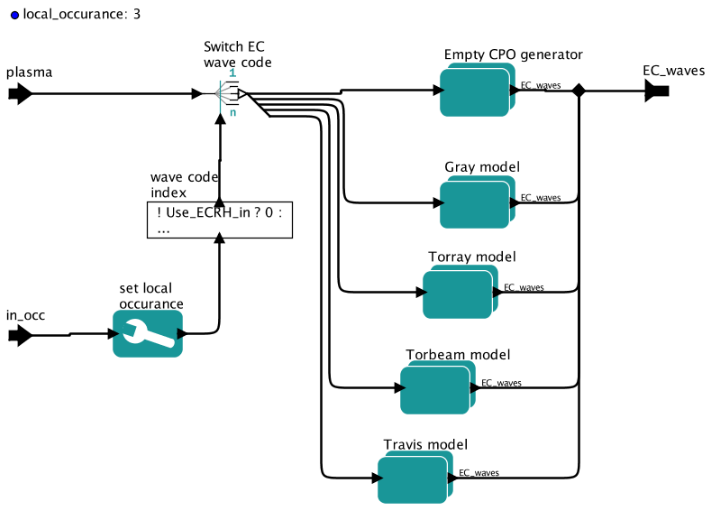
- **Combine_waves_and_sources_in_ion_FP** : Switch between using a single code for solving the ion Fokker-Planck equation including both wave and source heating, or to have two different solver calculating the heating from the wave and source terms.
- **Local_UALsliceCollection** : Enable UAL slice collection. Note that this parameter has to be switched off when running in the ETS.
- **enable_visualization** : Enable visualization. Note that this parameter has to be switched off in the ETS.
- **ic_wave_nr_toroidal_modes** : the number of toroidal Fourier modes to be used in the ICRF wave field.
- **number_nbi_markers_in** : the number of nbi markers to be used in Monte Carlo NBI solvers.

6.2.4 Composite Actor for Waves

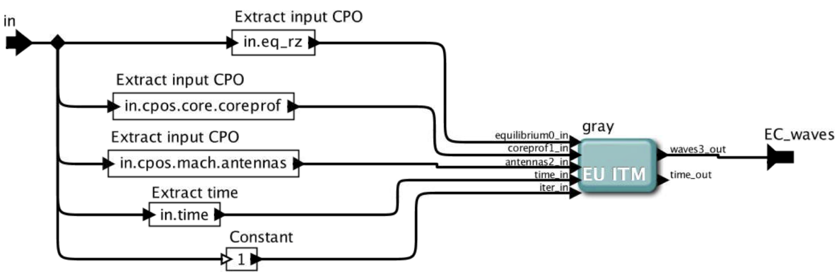
Wave field solvers in the IMP5 Composite Actor for Heating and Current Drive are collected in a composite actor, which in turns separates the different heating schemes ICRF, LH and ECRH. The three waves fields are then joined by a datajoiner for the waves CPO.



As an example we here show how the ECRH composite actor select the physics code to use from a long list. The variable that determines the selection is a global parameter `ec_wave_code` , set at the top-level of the composite actor IMP5HCD. Note that if you run IMP5HCD in the ETS `ec_wave_code` is set on a higher level.

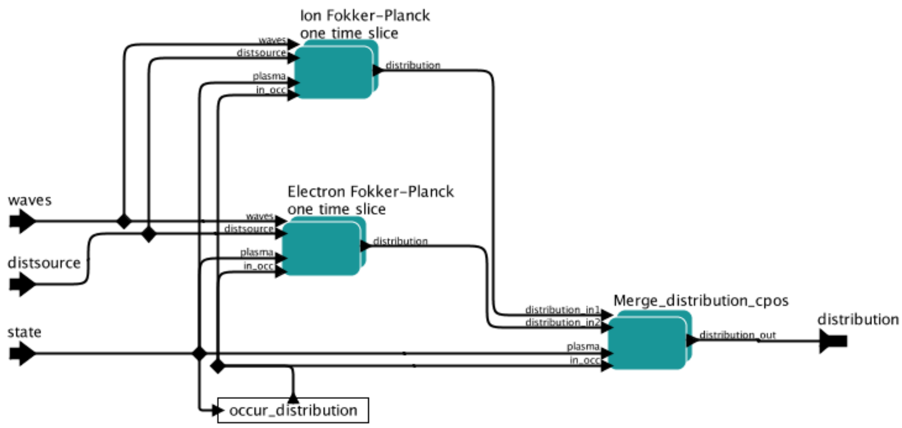


When selecting `ec_wave_code=gray` the workflow will entre the `Gray model` composite actor containing the Gray code (4.1.1), a ray tracer for EC waves.

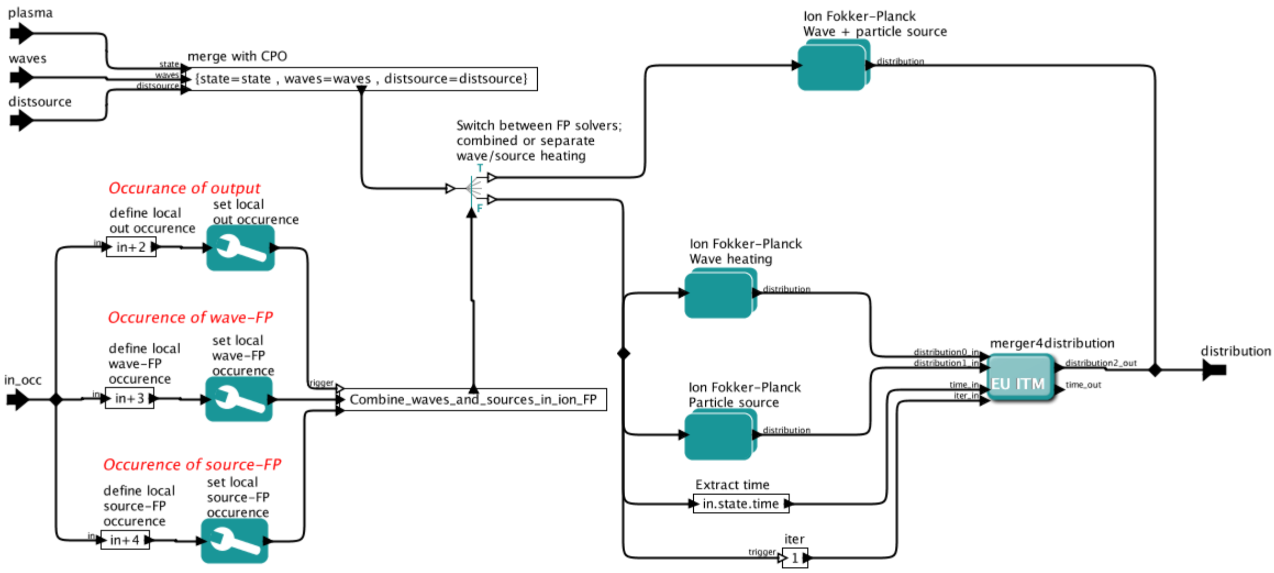


6.2.5 Composite Actor for Fokker-Planck

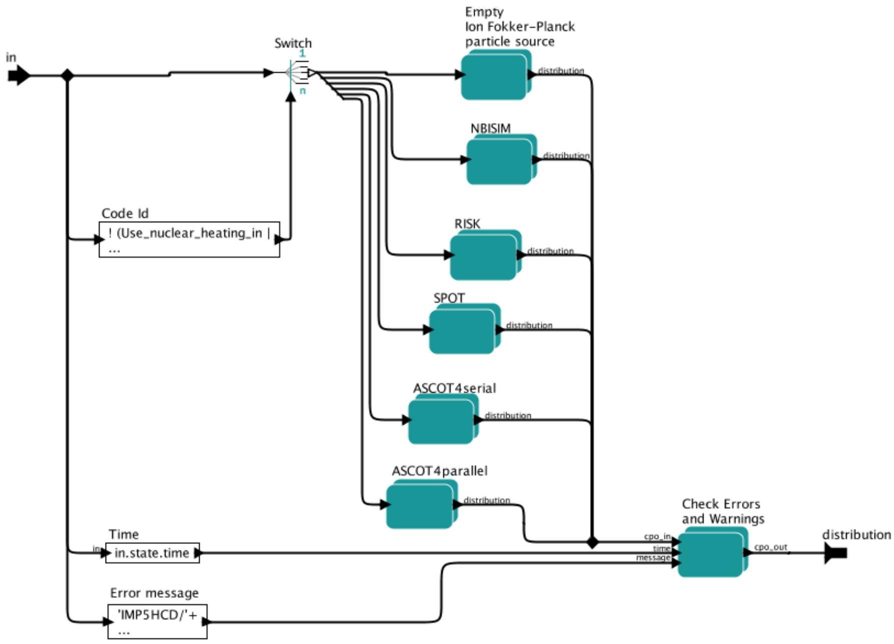
The composite actor for Fokker-Planck solvers are separated into solver for the electron and ion distribution function



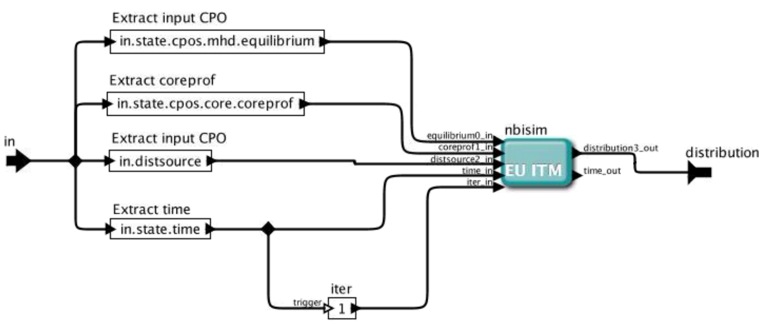
As an example is shown below the composite actor for the ion-Fokker Planck solvers. This solvers allows two different ways of operation, either the full Fokker-Planck equation is solved including both wave field acceleration and particle source terms (the box "Ion Fokker-Planck wave + particle source" in the figure), or alternatively the two effects (wave acceleration and particle source terms) are treated seperately in two different solver (...in the figure).



Next looking more carefully what's inside e.g. the "Ion Fokker-Planck particle source" box we find again both an Empty CPO Generator and a long list physics codes to choose between: `nbisim`, `risk`, `spot`, `ascot4serial`, `ascot4parallel` .



Finally, inside the NBISIM composite actor you find the nbisim actor.



6.2.6 CPOs-fields required for the IMP5HCD composite actor

An Actor running under IMP5HCD (6.2) have to fill in certain fields, or else the workflow will not work properly. Here follows a list of requirements in 4.08b, using Fortran notation; for C, Java, or matlab notation replace "%" by "." (a dot).

- `waves(.)%coherentwave(.)%grid_1d%rho_tor` [191]
  is required by imp5coresource (**??**). If this field is not filled, then the data in `waves(.)%coherentwave(.)` [192] will be discarded in the coresource output.

WARNING: This list is outdated. There are now a large number of reuqired fields that will be added to this list.

6.2.7 Error handling

When building advanced workflows like the IMP5HCD it is imparative that the individual components are robust and behaves in a controlled manner, even when the input is outside the conditions for validity. For this reason the ITM strongly encourage defensive programming [193].

The output of any ITM actor should in addition always provide error messages the output CPOs. Every CPO therefore includes a derived datatype called codeparam (located directly under the root of every CPO), which contains the field output_flag in which the error flag should be stored, see above.

< *any-cpo* >%codeparam%output_flag [194]	Integer output flag: 0 means the run was successful and can be used in the rest of the workflow, <0 means failure

---

last update: 2015-07-10 by tjohnson

6.3 IMP5 contributions to ETS

The IMP5 codes have been included in the ETS using the IMP5HCD [195] composite actor. In addition a composite actor for generating an initial state of the IMP5 cpos, including the input cpos Antennas and NBI has been provided.

6.3.1 Import a new version of IMP5HCD into the ETS

Importing the IMP5HCD into the ETS is still not done automatically. Here follows a description for how to import a new version of the IMP5HCD into the ETS.

6.3.1.1 Export IMP5HCD composite actors

The first step is to extract composite actors from the IMP5HCD_SA. To do this, go to the directory `imp5hcd/` and run the command:

```
make composite_actors
```

This will add the composite actors `IMP5HCD` , `IMP5HCD_CORE` and `initial_IMP5_state` as actors in your kepler folder.

6.3.1.2 Transfer IMP5HCD settings

First, note that these setting only need to be transferred when the setting parameters used in the IMP5HCD has been changed. Also, the setting cannot be transferred in the Kepler-gui. Instead this can be done directly in the xml using a text editor.

---

[191] https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#waves_global_param
[192] https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#coherentwave
[193] https://www.efda-itm.eu/ITM/html/F90AssertionsModule.html#F90AssertionsModule
[194] https://www.efda-itm.eu/ITM/html/itmtypes__4.09a.html#waves_global_param
[195] https://www.efda-itm.eu/ITM/html/.html#imp5_compositeactor_imp5hcd

First step here is to copy the setting from the file `imp5hcd_sa.xml` . To copy the settings copy all text starting from the element named

```
---- Start IMP5HCD settings
```

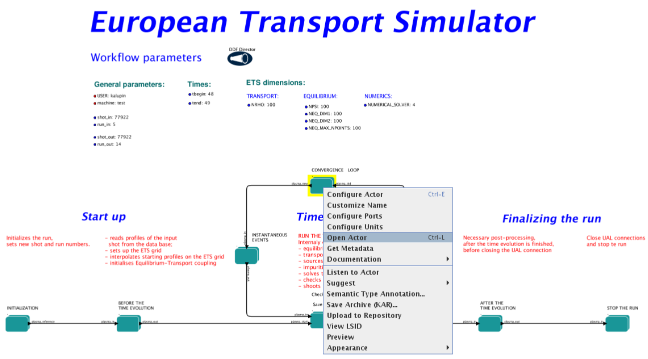
and ending with the element

```
---- End IMP5HCD settings
```

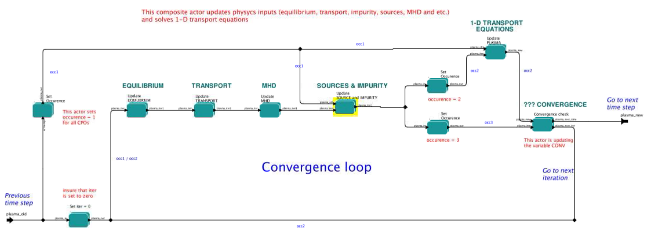
Then replace the corresponding section in the file `ETS_WORKFLOW.xml` .

6.3.1.3 Import IMP5HCD_CORE composite actors

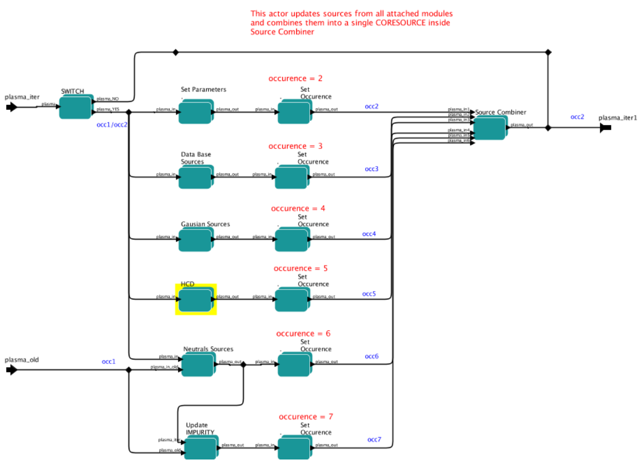
Next, download the ETS workflow, import the ETS actors and open the workflow (here are detailed instructions for each of these steps [196]) . Inside the ETS we find the IMP5HCD by first opening up the ”Convergence Loop”



Here we may edit the IMP5HCD settings by double clicking on the actor ”Update SOURCE and IMPURITY”. Next, open ”Update SOURCE and IMPURITY”

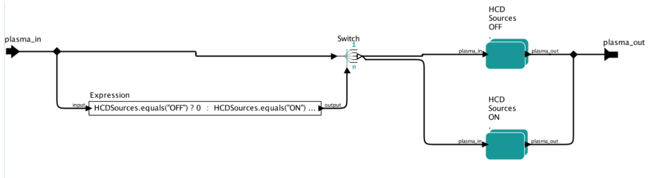


Open the ”HCD”

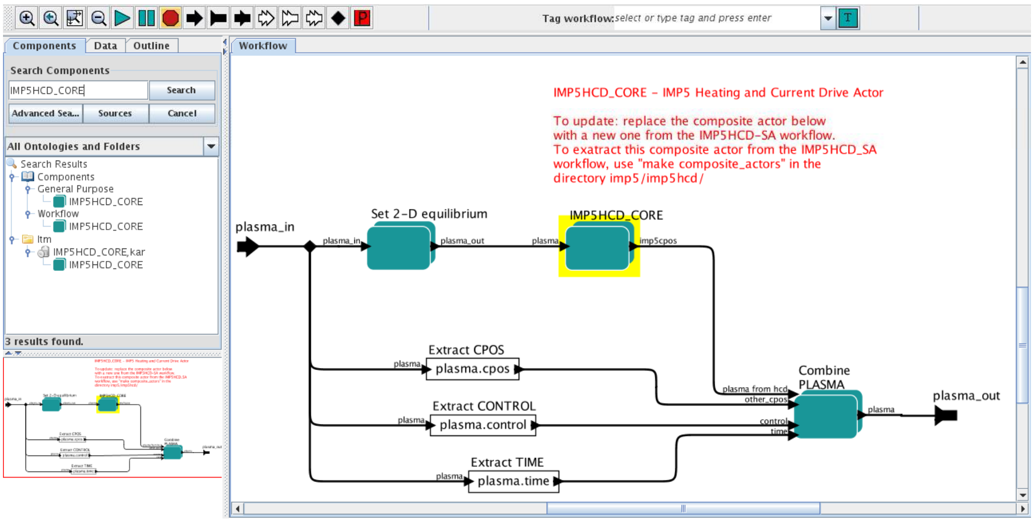


196 https://www.efda-itm.eu/ITM/html/.html#ETS_A_KEPLER

Open the "HCD Sources ON"

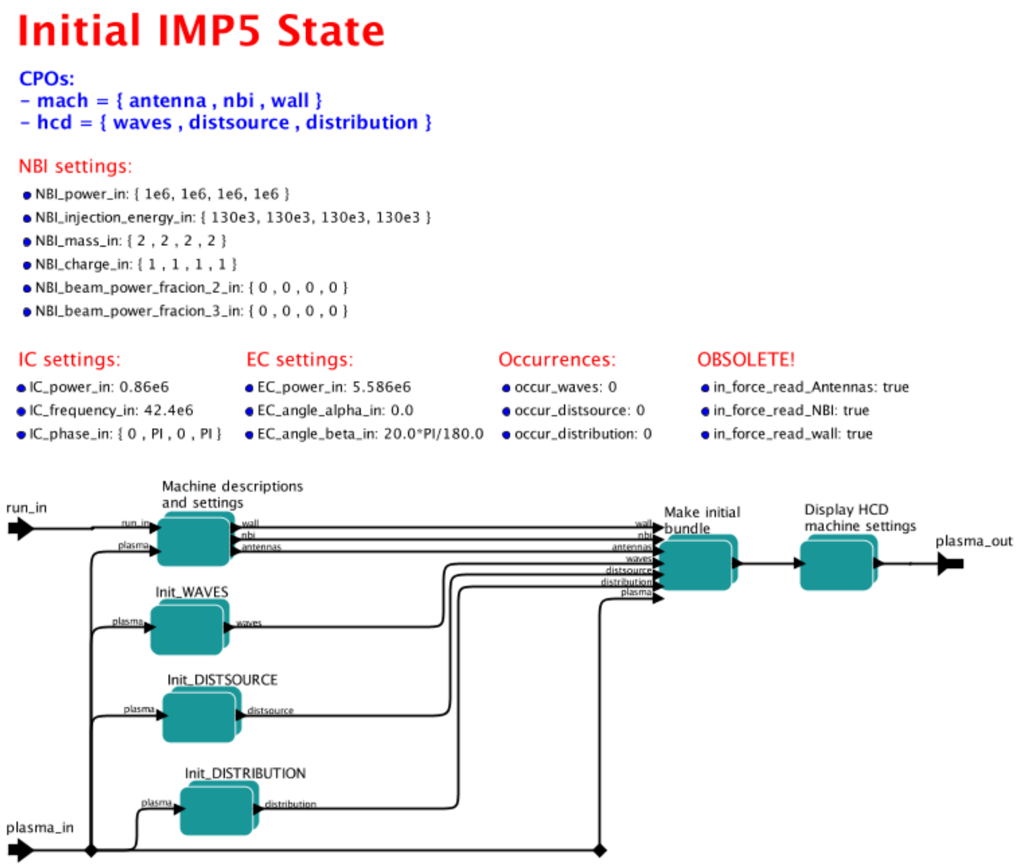


We are now at the place where the "IMP5HCD_CORE" should be imported. First, identify the old version of IMP5HCD Actor, marked in yellow in the figure below. Then search for the "IMP5HCD_CORE" among *Components/Search Components* , as shown in the figure below. Drag the "IMP5HCD_CORE" into the workflow to replace the old version.

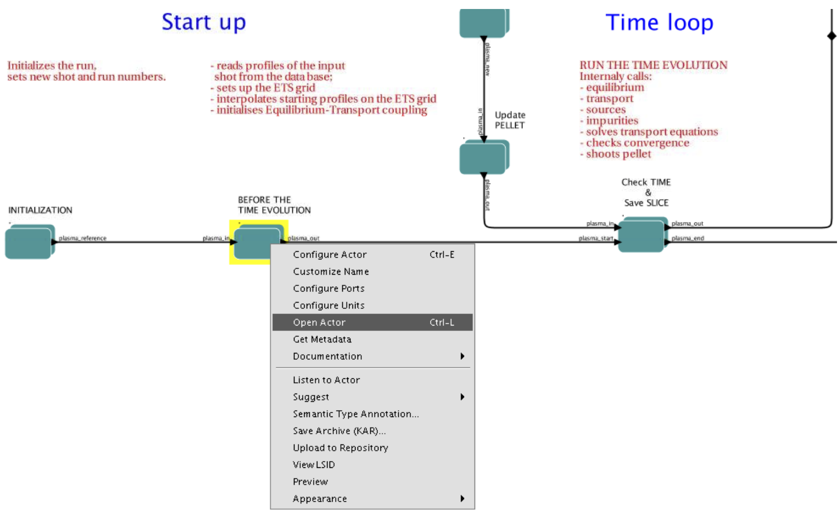


6.3.2 Import a new version of "initial_imp5_state" into the ETS

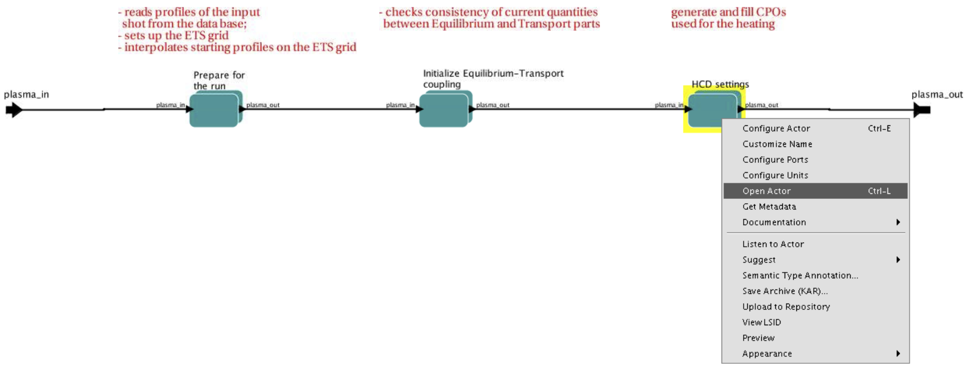
Here follows a description for how to import a new version of the composite actor "initial_imp5_state" into the ETS.



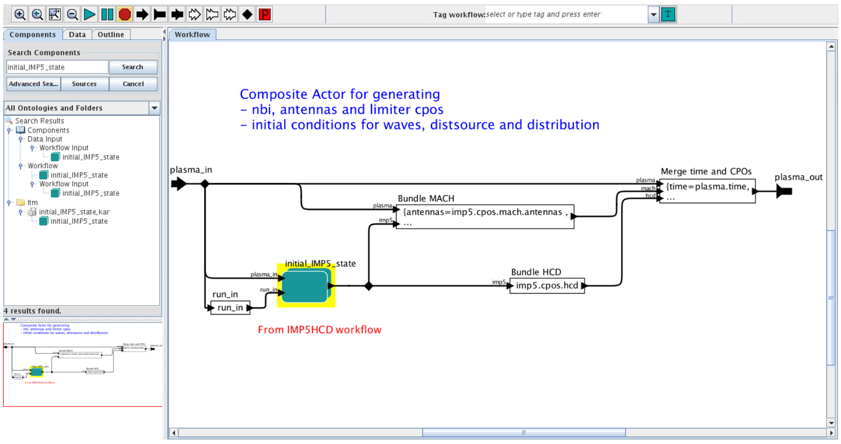
The first step to import the "initial_IMP5_state" is to extract the composite actor, as described here (6.3.1.1). Next open the workflow `ETS_WORKFLOW.xml` In the ETS_WORKFLOW_V2.1.xml workflow, open the Actor "BEFORE THE TIME EVOLUTION"



Next, open the Actor "HCD settings"



We're now at the place where the new "initial_imp5_state" Actor should be imported. First, identify the old version of the Actor, marked in yellow in the figure below. Then search for the "initial_imp5_state" among *Components/Search Components* , as shown in the figure below. Drag the "initial_imp5_state" into the workflow to replace the old version.



6.3.3 Proceedure for providing a physics module to the IMP5HCD and the ETS

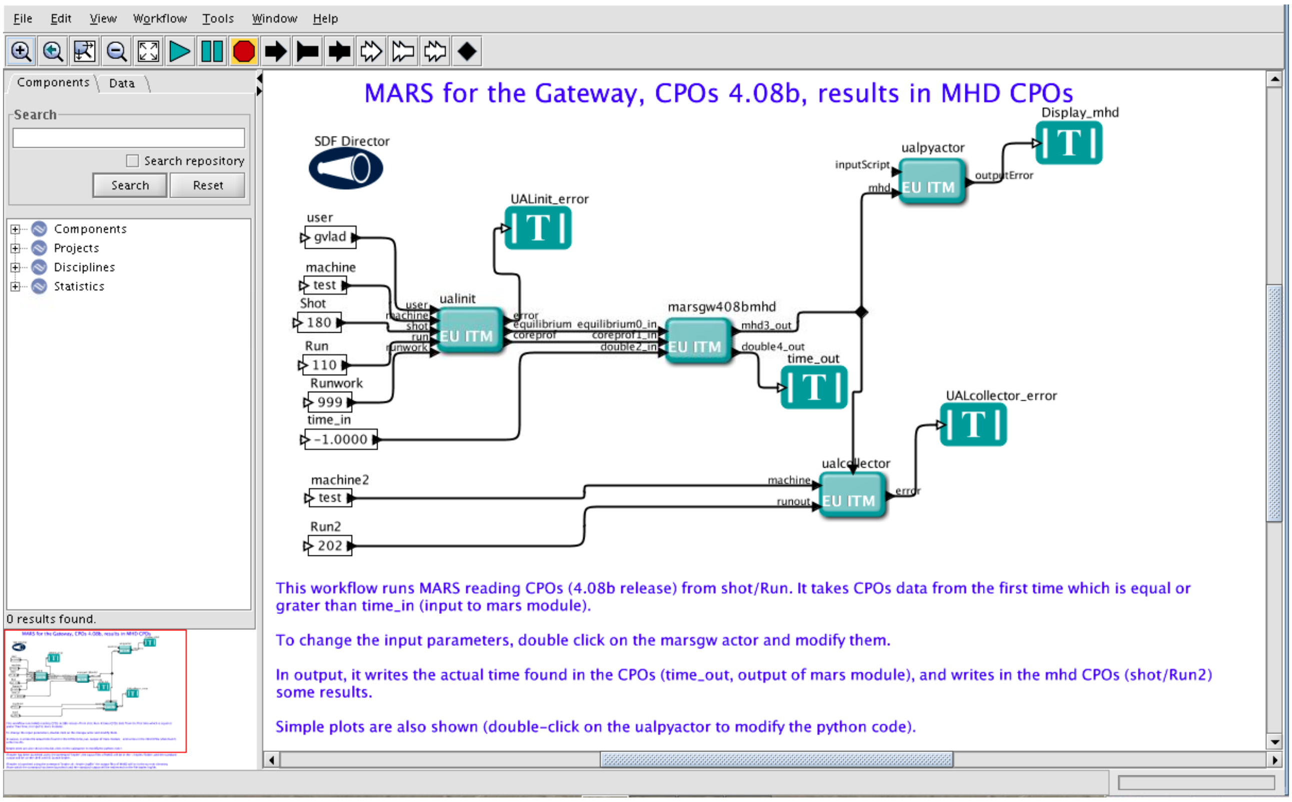
The following is a proceedure for coupling an actor (physics module) to the ETS:

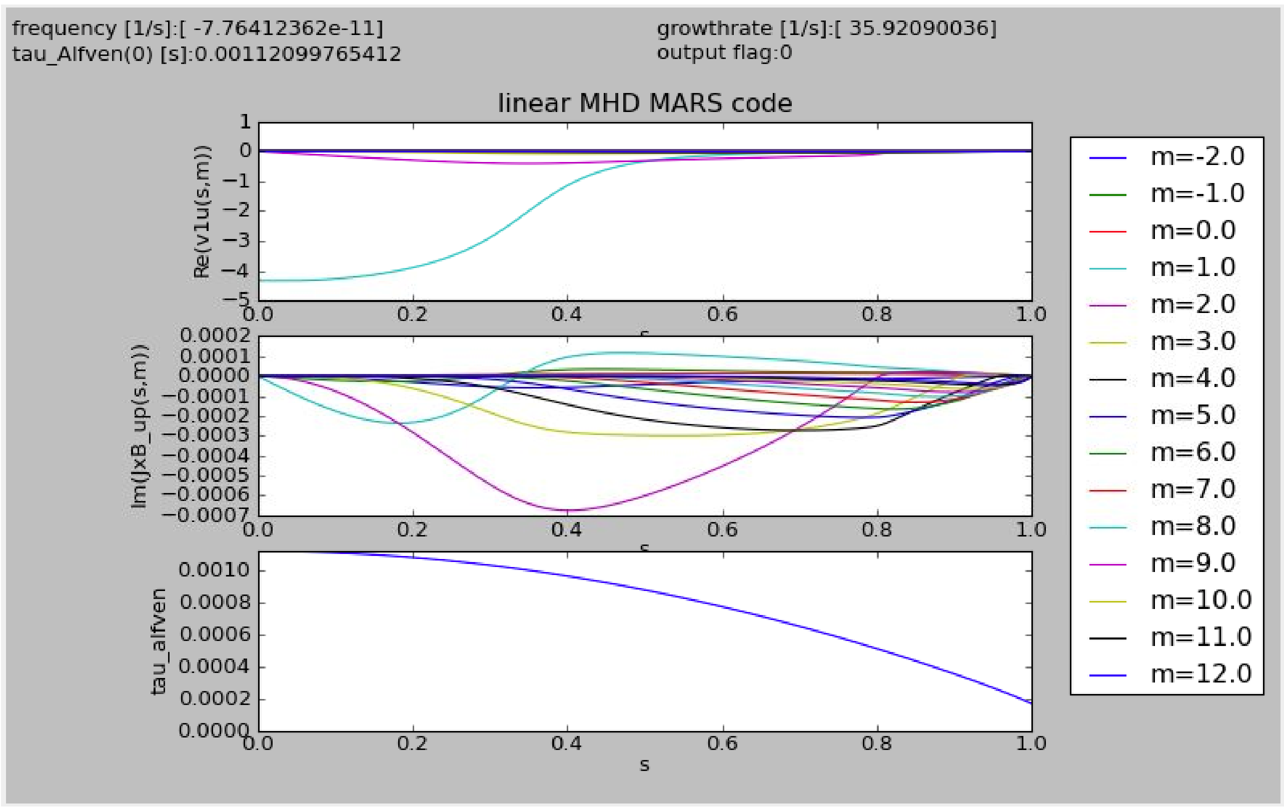
1. Build an single-code-workflow for testing your actor. This workflow may include only UALinit, the actor with "your physics module" and the UAL collector; all coupled serially. One such example is the Mars workflow (6.4), which include also advanced features like a phytons visualisation actor.
2. Verify that your actor reproduces results obtained in previous non-Kepler based version of your code
3. Download the IMP5HCD-SA workflow (see Accessing the IMP5HCD-SA workflow (6.1.2))
4. Import your actor into the IMP5HCD
5. Verify that you get the same result that you got in your single-code-workflow
6. Download the ETS workflow
7. Import your version of the IMP5HCD into the ETS workflow (see Import IMP5HCD into the ETS (6.3.1))
8. Verify that your code give the correct result in the ETS
9. Verify that your is correctly captured in the coresource CPO generated by the workflow

6.4 Workflow for MARS (MHD module of HYMAGYC)

This workflow reads equilibrium and coreprof CPOs and solves the linear MHD stability equations; some ouputs (mhd CPOs is still in a preliminary version) are stored in mhd CPOs and then plotted using a python actor (see figure below, which refers to a n=1 internal kink in a JET-like equilibrium).

Type	Actors	Input CPOs	Output CPOs
linear MHD module for HYMAGYC	ualinit marsgw408b ualpyactor ualcollector	equilibrium coreprof	mhd

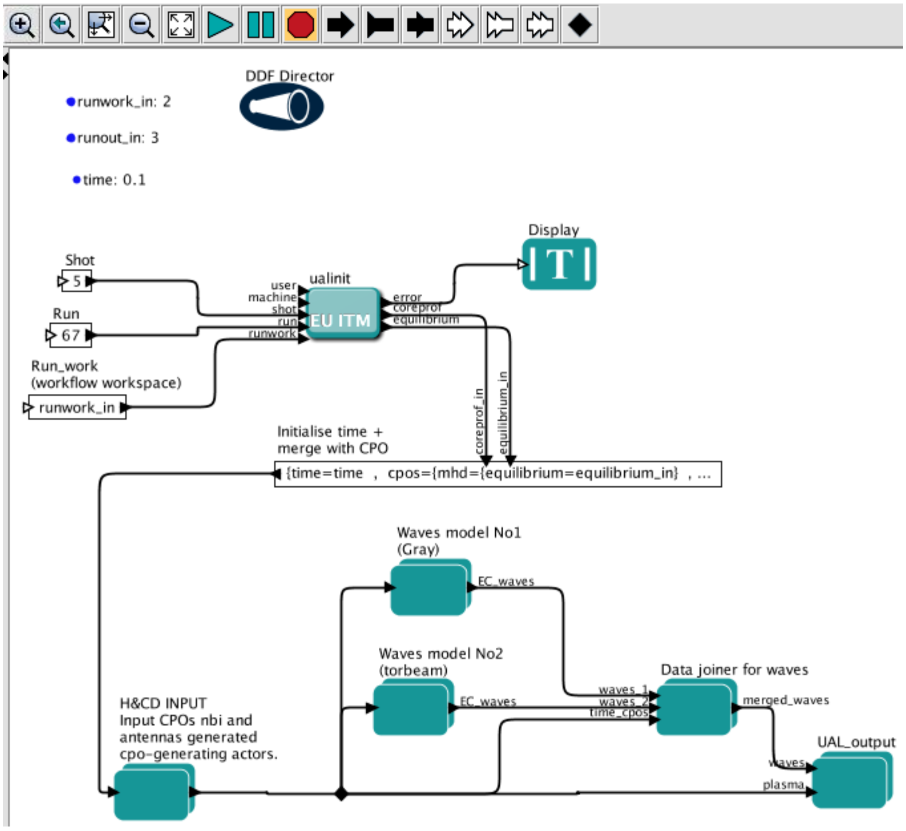




6.5 Workflow for code-code Benchmarking

NOTE: this workflow was developed for 4.08b.

The IMP5 has developed a workflow for benchmarking wave codes generating the `waves` as output. The default version runs the two EC wave code GRAY and TORBEAM as shown below. The wprlflow runs the two codes in parallel and then merges the `waves` output from the two codes into a single `waves` CPO. Thus, the data from the two codes appear as `waves(1)%coherentwave(1)` and `waves(1)%coherentwave(2)` .



Contact persons: Thomas Johnson [197] (skype: tjohn74)

The waves_benchmark workflow can be found in the GFORGE [198] repository KeplerWorkflows [199]. For checking out a local copy of the 4.08b version of the workflow:

```
svn co https://gforge6.eufus.eu/svn/keplerworkflows/trunk/4.08b/imp5/benchmark/
```

For more information, see the file README_waves_benchmark (stored in the repository).

---

last update: 2019-01-31 by g2dpc

7 IMP5 Shots

Below are lists of shots available in the imp5-shot database; found in the public directory of the user wwwimp5.

```
~wwwimp5/public/itmdb/itm_trees/<machine>/<UAL>/mdsplus/0/
```

where <machine> is the name of the machine, e.g. "test", "jet", or "asdex" and <UAL> is the version number of the UAL, e.g. "4.09a" or "4.10a".

7.1 UAL Version 4.09a

The shots can be accessed by setting

[197] https://www.efda-itm.eu/ITM/html/itm_contact_list_2010.html#contact_thomas_johnson
[198] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_gforge
[199] https://gforge6.eufus.eu/project/keplerworkflows/

```
UAL = 4.09a
```

7.1.1 Machine: TEST

The shots can be accessed by setting

```
TOKAMAKNAME = test
```

The following table lists the shot by shot number and run number together with the list of stored CPOs [200] , the user name of the database, and a short description.

Shot	Run	CPOs	user	generated with	description
5	67	equilibrium coreprof	Coster	ETS fortran workflow (with equilibrium from the eqaugmenter)	ITER sized test plasma.
	1067	equilibrium coreprof antennas waves	Figini / Coster	Gray processing of machine=test/shot=5/run=67 from ETS fortran workflow (with equilibrium from the eqaugmenter)	ITER sized test plasma.

7.1.2 Machine: ASDEX

The shots can be accessed by setting

```
TOKAMAKNAME = aug
```

The following table lists the shot by shot number and run number together with the list of stored CPOs [201] , the user name of the database, and a short description.

Shot	Run	CPOs	user	generated with	description
20116	502	equilibrium coreprof	Coster	ETS fortran workflow (with equilibrium from the eqaugmenter)	ASDEX plasma (possibly shot 20116, run 2 documented in the IMP12 page, reprocessed using the ETS).

7.1.3 Machine: JET

The shots can be accessed by setting

```
TOKAMAKNAME = jet
```

The following table lists the shot by shot number and run number together with the list of stored CPOs [202] , the user name of the data base, and a short description.

Shot	Run	CPOs	user	generated with	description
10	6	equilibrium coreprof...	huynh?		JET shot 77922 using nclass, bgb, equilibre chease, and transport solver equation in te, ti et psi. The shot starts from 48.488s to 57.2283s. Default input to the CEA-ETS workflow.
77922	1	equilibrium coreprof...	kalupin?		JET shot 77922. Taken from the imp3/ets repository 22 November 2011. Default input to the IPP/IST-ETS workflow.
71827	1	equilibrium coreprof...	kalupin?		JET shot 71827. Taken from the imp3/ets repository 22 November 2011.

[200] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo
[201] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo
[202] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo

7.2 UAL Version 4.10a

The shots can be accessed by setting

```
UAL = 4.10a
```

7.2.1 Machine: TEST

The shots can be accessed by setting

```
TOKAMAKNAME = test
```

The following table lists the shot by shot number and run number together with the list of stored CPOs [203] , the user name of the data base, and a short description.

Shot	Run	CPOs	user	generated with	description
5	67	equilibrium coreprof	Coster	ETS fortran workflow (with equilibrium from the eqaugmenter)	ITER sized test plasma.
	68	equilibrium coreprof	Coster	ETS fortran workflow (with equilibrium from the eqaugmenter)	ITER sized test plasma.
77299	12	equilibrium coreprof ??	Kalupin	ETS-A workflow	Unknown.

last update: 2013-03-29 by tjohnson

8 Meetings

8.1 2010/09/13-17 ITM General Meeting in Lisbon

8.1.1 Posters

- *GRAY - EC quasi-optical ray-tracing code for ECRH and ECCD calculations in tokamaks* (pdf [204]) (pptx [205]), by Daniela Farina and Lorenzo Figini
- *Numerical Codes for Electron Cyclotron heating and Current Drive* (pdf [206]), by Egbert Westerhof and Nicola Bertelli
- *Neutral Beam Injection in ITM* (pdf [207]) (ppt [208]), by Mireille Schneider and Lars-Göran Eriksson
- *Modelling NBI in ITM environment with ASCOT* (pdf [209]), by Otto Asunta and Seppo Sipilä;
- *IMP5 / ACT4: RF Monte Carlo library for orbit following codes* (pdf [210]) (ppt [211]), by Thomas Johnson
- *Numerical Stability Analysis in the Accelerated Orbit Following Monte-Carlo Method* (pdf [212]), by György Steinbrecher

[203] https://www.efda-itm.eu/ITM/html/itm_glossary.html#g_cpo
[204] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk+Poster_FiginiFarina_Grey_ITM-GM2010.pdf
[205] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk+Poster_FiginiFarina_Grey_ITM-GM2010.pptx
[206] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Poster_Westerhof_TORAY-RELAX_ITM-IMP5-GM2010.pdf
[207] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Poster_Schneider_NBIstatus_ITM-IMP5-GM2010.pdf
[208] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Poster_Schneider_NBIstatus_ITM-IMP5-GM2010.ppt
[209] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk+Poster_Asunta_ASCOT_ITM-GM2010.pdf
[210] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Poster_Johnson_RFOF_ITM-GM2010.pdf
[211] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Poster_Johnson_RFOF_ITM-GM2010.ppt
[212] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Poster_Steinbrecher_ITM-GM2010.pdf

- *Fast Particles activities during WP10* (pdf [213]), by Gregorio Vlad

8.1.2 Code overview talks

- *GRAY - EC quasi-optical ray-tracing code for ECRH and ECCD calculations in tokamaks* (pdf [214]) (pptx [215]), by Daniela Farina and Loretzo Figini
- *Numerical codes for electron cyclotron heating and current drive* (pdf [216]), by Nicola Bertelli and Egbert Westerhof
- *TORBEAM: Physical Model* (pdf [217]) (ppt [218]), by Nicola Bertelli and Egbert Westerhof
- *Full-wave modelling of electromagnetic wave propagation with the code FWTOR* (pdf [219]) (ppt [220]), by Christos Tsironis
- *Fast ICRH code for routine analysis* (pdf [221]) (ppt [222]), by Torbjörn Hellsten
- *Modelling NBI in ITM environment with ASCOT* (pdf [223]), by Otto Asunta and Seppo Sipilä;
- *Present status of NBI codes for ITM* (pdf [224]) (pptx [225]), by Mireille Schneider
- *Magnetohydrodynamic Properties of Nominally Axisymmetric Systems with 3D Helical Core* (pdf [226]), by Tony Cooper
- *IMP5 / ACT4: RF Monte Carlo library for orbit following codes* (pdf [227]) (ppt [228]), by Thomas Johnson
- *Numerical Stability Analysis in the Accelerated Orbit Following Monte-Carlo Method* (pdf [229]), by György Steinbrecher
- *IMP5: Energetic Particles* (pdf [230]) by Gregorio Vlad
- *Hybrid MHD-Gyrokinetic codes for studying the mutual nonlinear interaction of shear Alfvén modes and energetic particles* (pdf [231]), by Gregorio Vlad

[213] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Poster_Vlad_Fast_Particles_ITM-GM2010.pdf
[214] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk+Poster_FiginiFarina_Grey_ITM-GM2010.pdf
[215] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk+Poster_FiginiFarina_Grey_ITM-GM2010.pptx
[216] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Bertelli_ECcodes_ITM-IMP5-GM2010.pdf
[217] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Bertelli_TORBEAM_ITM-IMP5-GM2010.pdf
[218] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Bertelli_TORBEAM_ITM-IMP5-GM2010.ppt
[219] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Tsironis_FWTOR_ITM-IMP5-GM2010.pdf
[220] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Tsironis_FWTOR_ITM-IMP5-GM2010.pdf
[221] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Hellsten_SELFO-light_ITM-IMP5-GM2010.pdf
[222] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Hellsten_SELFO-light_ITM-IMP5-GM2010.ppt
[223] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk+Poster_Asunta_ASCOT_ITM-GM2010.pdf
[224] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Schneider_NBIstatus_ITM-IMP5-GM2010.pdf
[225] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Schneider_NBIstatus_ITM-IMP5-GM2010.ppt
[226] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Cooper_icpp2010_ITM-IMP5-GM2010.pdf
[227] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_RFOF_ITM-GM2010.pdf
[228] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_RFOF_ITM-GM2010.ppt
[229] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Steinbrecher_ITM-GM2010.pdf
[230] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Vlad_Energetic_Particles_ITM_GM2010.pdf
[231] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Vlad_HMGC_HYMAGYC_ITM_GM2010.pdf

8.1.3 Talks on infrastructure and tools

- *IMP5 CPOs* (pdf [232]) (ppt [233]), by Thomas Johnson
- *Quick introduction to documentation with Doxygen* (pdf [234]) (ppt [235]), by Thomas Johnson
- *IMP5: ITM tools a quick start* (pdf [236]) (ppt [237]), by Thomas Johnson

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8.2 2011 Code Camp in Prague, 11-15 July

- *Analysis of Runaway Electrons by Numerical Algorithms* (pdf [238]), by G. Csepany
- *GRAY code status* (pdf [239]), by L. Figini
- *Ray-Tracing Code TRAVIS* (pdf [240], ppt [241]), by N. Marushchenko
- *IMP5 tools in 4.09a* (pdf [242], pptx [243]), by T. Johnson
- *Code Camp report* (pdf [244], ppt [245]), by V. Goloborodko

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8.3 2011 General ITM meeting in Garching, 12-16 September

8.3.1 Plenary talks by IMP5

- *Integration of heating and fast particles models* (ppt [246]), by Thomas Johnson

8.3.2 Summary talks by IMP5

- *IMP5 Summary* (pdf [247]), by Daniela Farina

[232] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_CPOs_ITM-GM2010.pdf
[233] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_CPOs_ITM-GM2010.ppt
[234] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_Documentation_ITM-GM2010.pdf
[235] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_Documentation_ITM-GM2010.ppt
[236] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_ITMtools_ITM-GM2010.pdf
[237] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20100913-17_Lisbon/Talk_Johnson_ITMtools_ITM-GM2010.ppt
[238] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Gergely--summary_arena_prague_cc2011.pdf
[239] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Lorenzo--GRAY-status-ITM-CC_prague_cc2011.pdf
[240] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Nicolai--TRAVIS_ITM_prague_cc2011.pdf
[241] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Nicolai--TRAVIS_ITM_prague_cc2011.ppt
[242] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Thomas-PragueSummary_prague_cc2011.pdf
[243] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Thomas-PragueSummary_prague_cc2011.pptx
[244] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Victor--code_camp_report__prague_cc2011.pdf
[245] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110711-15_Prague_Code_Camp/Talk_Victor--code_camp_report__prague_cc2011.pdf
[246] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_imp5_workflow_johnson.ppt
[247] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_Farina_IMP5_Summary.pdf

8.3.3 Progress reports during IMP5 session

- *IMP5: Energetic Particles* (ppt[248], pdf[249]), by G. Vlad
- *ARENA+ in ITM* (pdf[250]), by G. Pokol
- *TORBEAM for ITM* (ppt[251], pdf[252]) by E. Poli
- *Ray-Tracing Code TRAVIS* (ppt[253], pdf[254]), by N. Marushchenko
- *SELFO-light and advanced Fokker-Planck developments* (ppt[255], pdf[256]), by T. Hellsten
- *GRAY: quasi-optical ray-tracing code for ECH/CD* (pdf[257]), by L. Figini

8.3.4 Talks on infrastructure and tools

- *Training: The IMP5HCD workflow* (pdf[258]), by Thomas Johnson

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8.4 2011 Code Camp in Innsbruck, 28 November-11 December

The participation of the IMP5 in the Innsbruck Code Camp was discussed at the General Meeting in Garching. The preliminary plan is that the IMP5 will participate both weeks of the Code Camp.

- **Week 1:** Focus on integration with the aim of having as many as possible present to reach a critical mass of modellers so that we can help each other.
- **Week 2:** Focus on integration into the ETS. Also integration will take place, but there will be fewer people there to ask for help.

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9 IMP5 Benchmarking

9.1 Report from the 2014 benchmarking activities

- Report on IC benchmarking in 2014[259]
- Report on EC benchmarking in 2014[260]
- Report on NBI benchmarking in 2014[261]

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[248] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_HMGC-HYMAGYC.ppt
[249] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_HMGC-HYMAGYC.pdf
[250] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_Pokol_ARENA.pdf
[251] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_TORBEAM_ITM-2011.ppt
[252] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_TORBEAM_ITM-2011.pdf
[253] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_TRAVIS_ITM_Garching_Sept2011_1.ppt
[254] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_TRAVIS_ITM_Garching_Sept2011_1.pdf
[255] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_Hellsten_SELFOlight.ppt
[256] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_Hellsten_SELFOlight.pdf
[257] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_talk_Gray-status.pdf
[258] https://www.efda-itm.eu/ITM/imports/imp5/public/meetings/20110912-16_GM_Garching/GM2011_training_imp5hcd_Johnson.pdf
[259] https://www.efda-itm.eu/ITM/imports/imp5/public/benchmark/2014/
[260] https://www.efda-itm.eu/ITM/imports/imp5/public/benchmark/2014/WP14-D05-EC_benchmark.docx
[261] https://www.efda-itm.eu/ITM/imports/imp5/public/benchmark/2014/NBI_benchmarks_2014_v03.docx

10 Private IMP5 pages

To access the private IMP5 pages [262], an IMP5 password is needed.

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[262] https://www.efda-itm.eu/IMP5/html/index.html