EFDA
EUROPEAN FUSION DEVELOPMENT AGREEMENT
Task Force
INTEGRATED TOKAMAK MODELLING

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IMP12 Kepler Workflows

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https://www.efda-itm.eu/~wwwimp3/TEST/ITM/html/

IMP12 Workflows

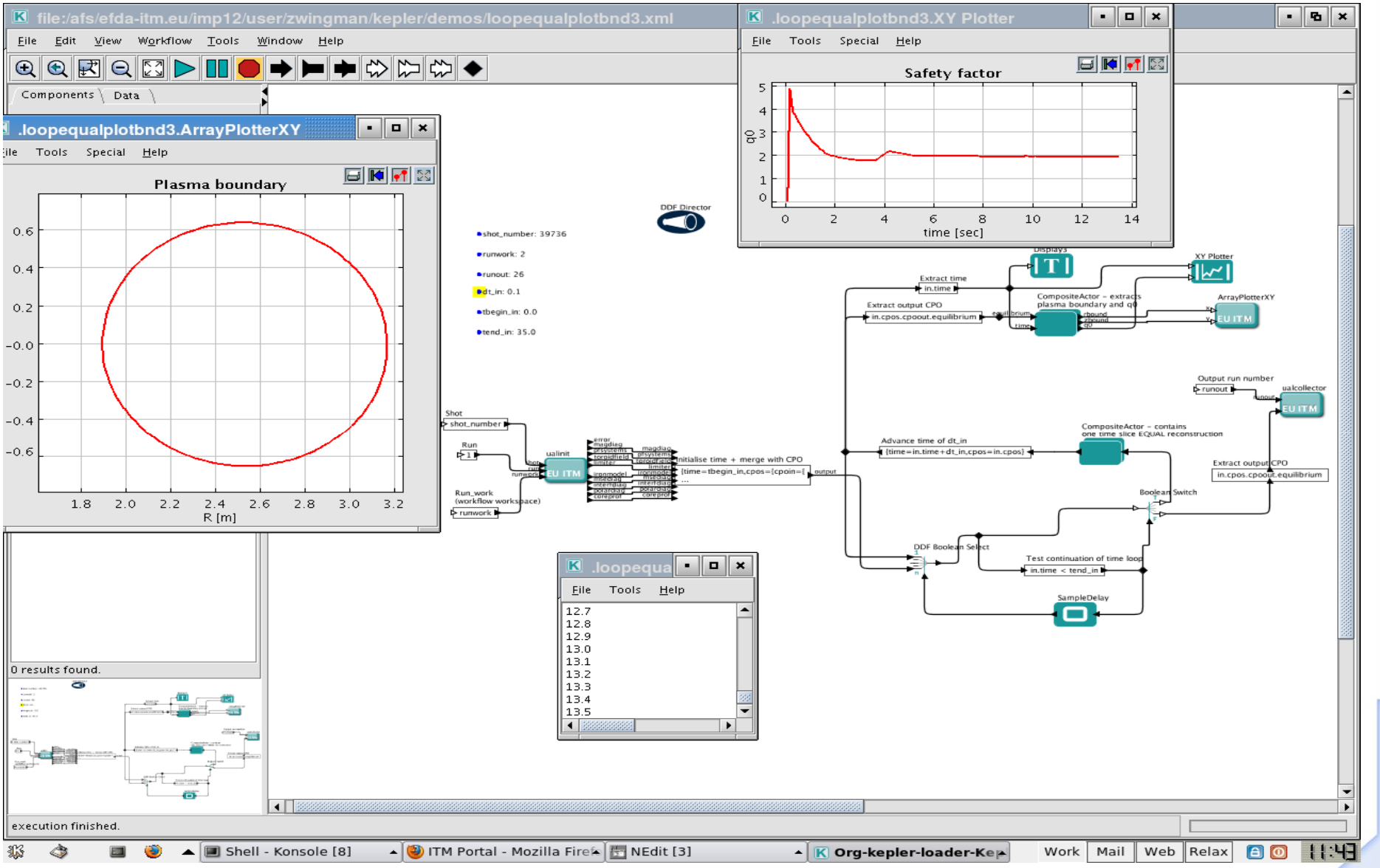
2009: several modules reach maturity level

- free boundary equilibrium solvers: EQUAL
- high resolution fixed boundary equilibrium solvers: HELENA, CHEASE, CAXE
- linear MHD stability modules: ILSA, KINX

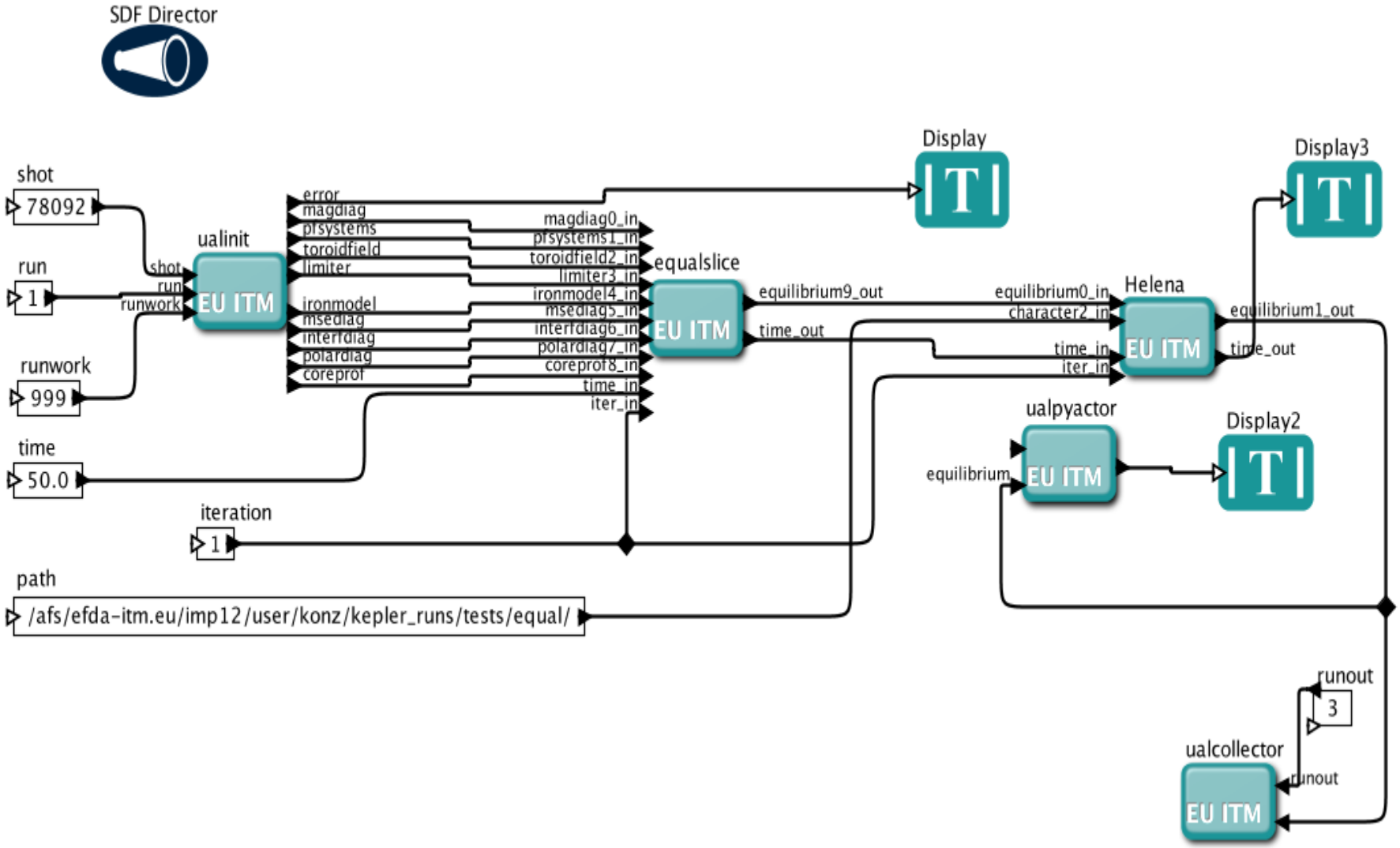
2010: first production level workflows

- free boundary equilibrium reconstruction
- high resolution fixed boundary equilibrium calculation
- linear MHD stability chain
- linear j-α stability chain

Free Boundary Equilibrium Reconstruction

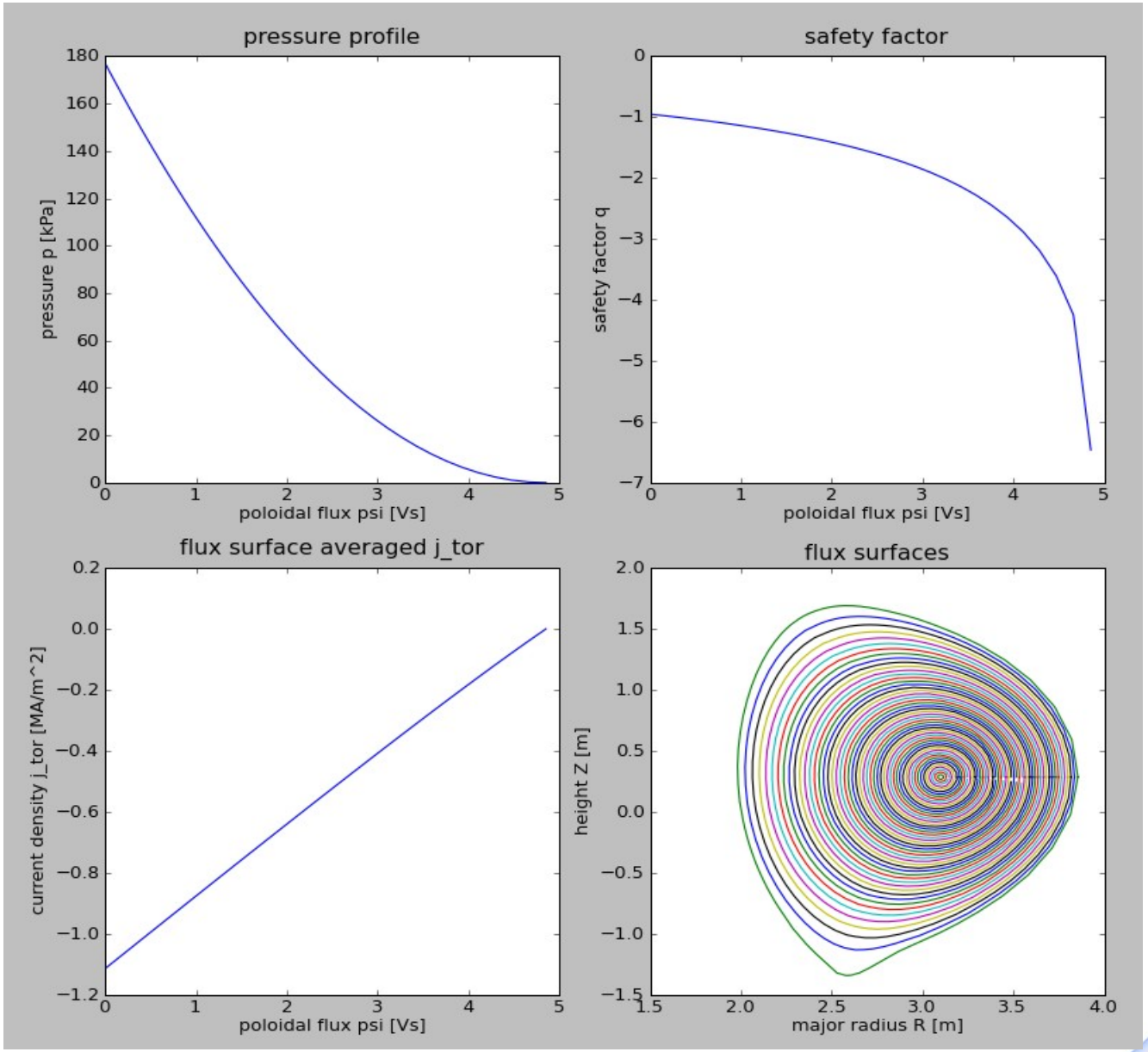


High Resolution Equilibrium Chain

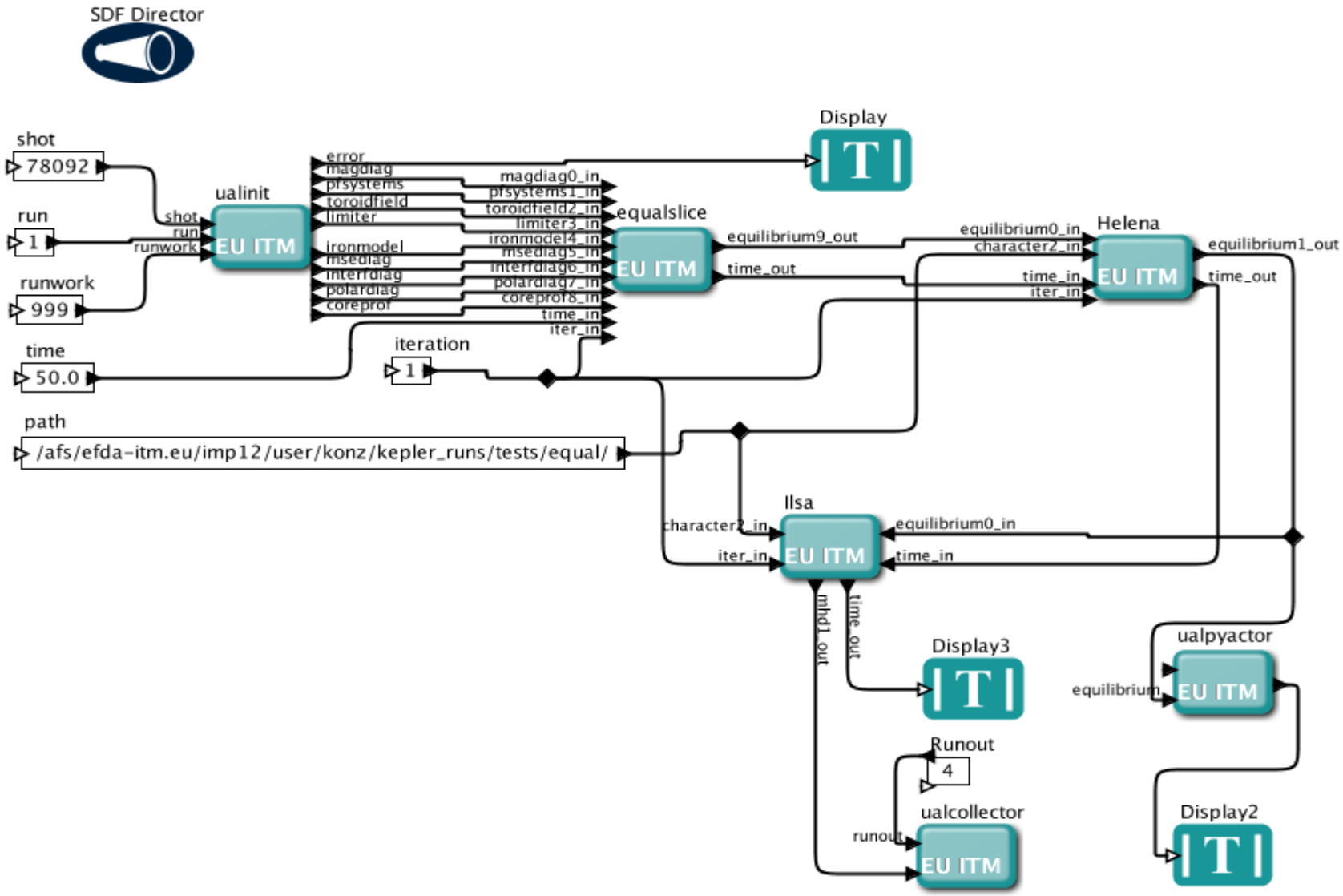


High Resolution Equilibrium Chain

JET pulse no.
78092@50.0s

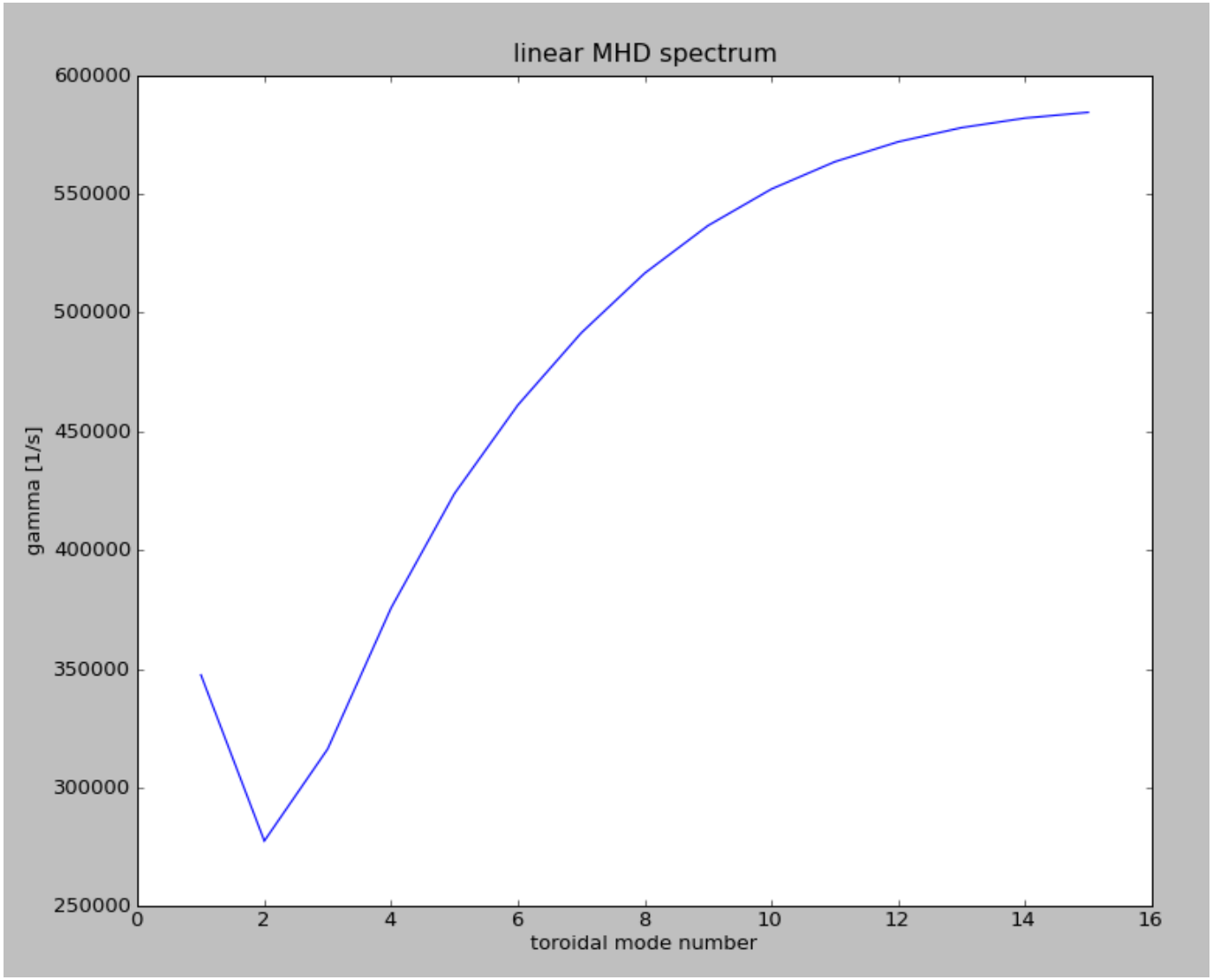


Linear MHD Stability Chain

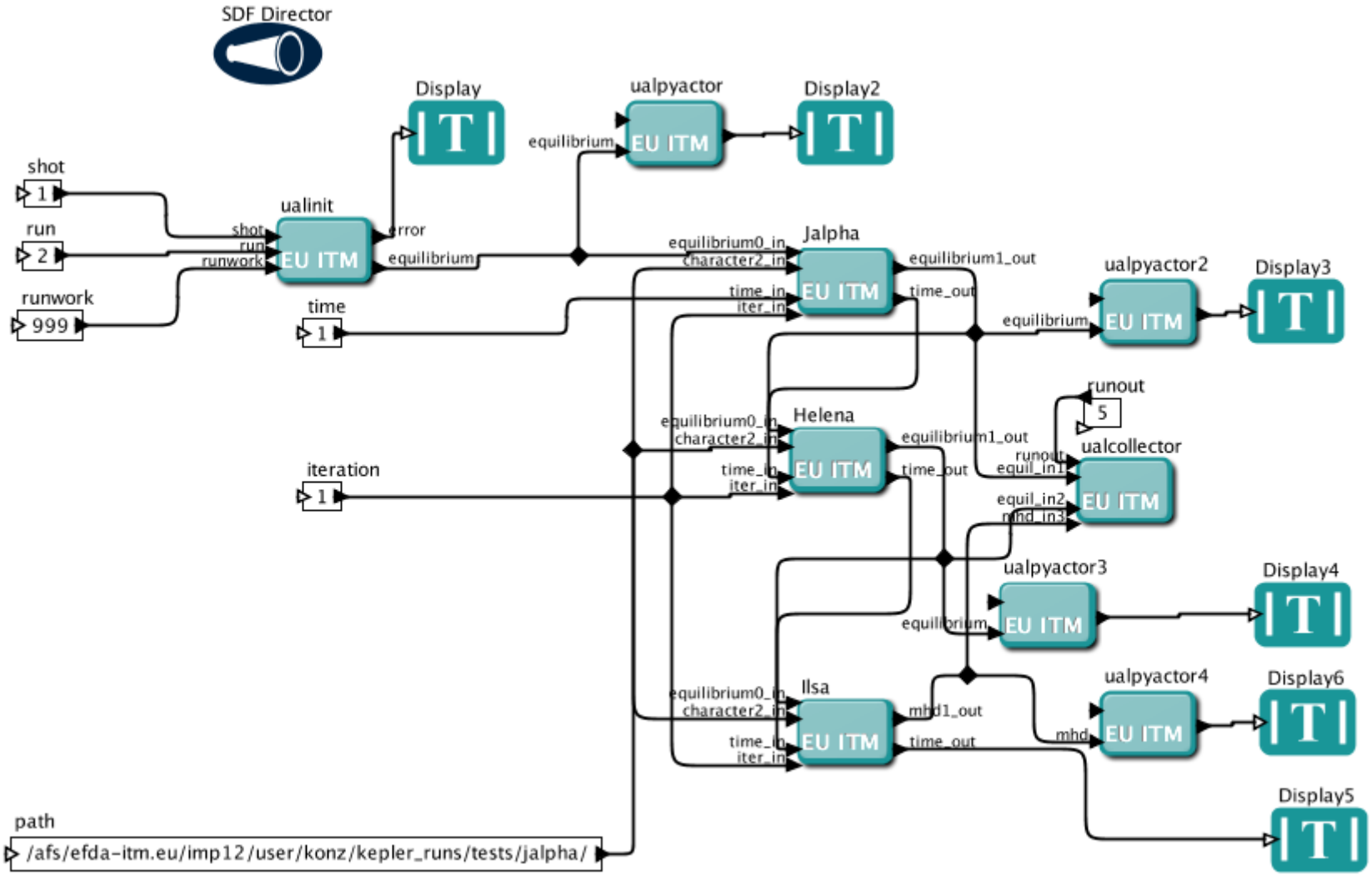


Linear MHD Stability Chain

Analytical equilibrium



Linear j-α Stability Chain



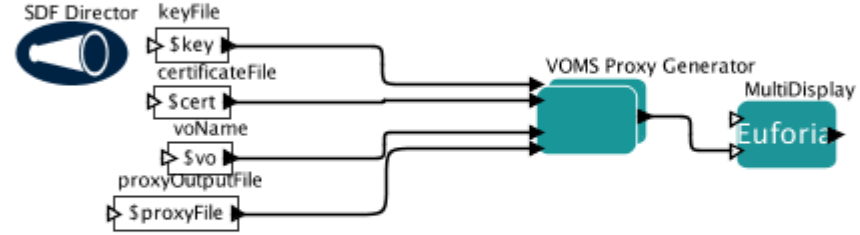
EUFORIA: j-α Stability Diagrams

Initialize VOMS proxy:

Requires userkey.pem and usercert.pem

workflow type: GRID/HPC

In order to get applications running using Java API 4 HPC/GRID you have to generate VOMS proxy for VO that you are registered in. This can be done using following workflow.



You will need following elements for proxy generation:
- user key
- user certificate
- password

You can set location of both: user key and user certificate by setting 'key' and 'cert' parameters.

- DEMO_LOCATION: $HOME
- key: $DEMO_LOCATION/serpens/core/cert/userkey.pem — Specify your key file location here
- cert: $DEMO_LOCATION/serpens/core/cert/usercert.pem — Specify your certificate file location here
- proxyFile: $DEMO_LOCATION/serpens/core/cert/proxy

VOMS proxy is generated using Roaming Access Server that provides transparent access to i2g, gLite based infrastructures.

At the moment, there are two RASes dedicated to EUFORIA project. In order to use one of them, you have to set hostRAS parameter to either $ras or $ras2

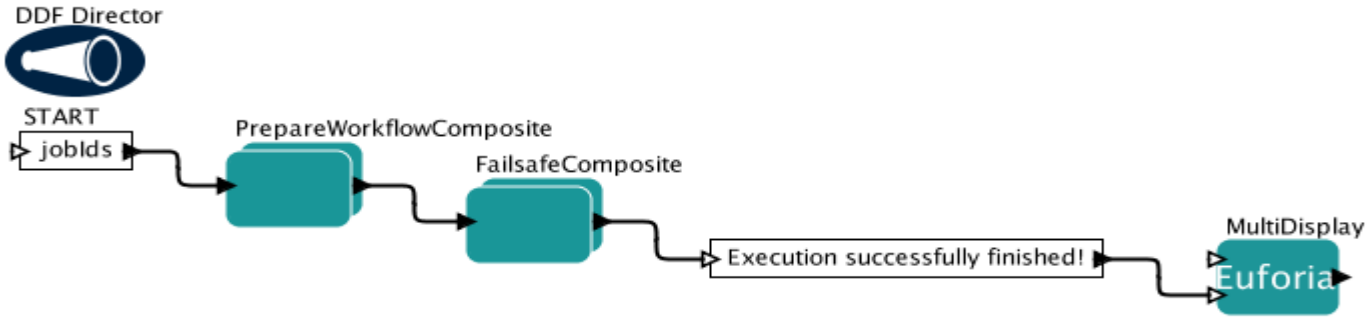
vo parameter determines which VO will be used during VOMS proxy generation. By default it is set to euforia

proxyFile parameter points to the location of file that will contain VOMS proxy after it is generated

- rasHost: $ras
- vo: euforia

- ras: http://stipa.man.poznan.pl:8080
- ras2: http://i2gras01.ifca.es:8080
- ras3: http://senecio.man.poznan.pl:8080
- ras4: http://senecio.man.poznan.pl:8090
- ras5: http://cedrus.man.poznan.pl:8080
- ras6: http://enea144.efda-itm.eu:8080

EUFORIA: j-α Stability Diagrams



Submit 121 parametric j-α chains to GRID

PARAMETERS

You MUST change these

- parameters for JALPHA input generators

params: {{0.5,1.5,0.1}, {0.5,1.5,0.1}}

You MUST check if these are correct

- 'demos/' directory location
- proxy file location
- output directory location
- RAS address

ras: $ras_senecio
demoLocation: $HOME
proxyLocation: $demoLocation/serpens/core/cert/proxy
isTunnelled: false

Leave these unchanged

- predefined RAS addresses
- tables' names in the internal database
- jobs' statuses counters
- file with main jobs' ids stored

ras_balsa: http://balsa.man.poznan.pl:8080
ras_cedrus: http://cedrus.man.poznan.pl:8080
ras_senecio: http://senecio.man.poznan.pl:8080

EUFORIA: j-α Stability Diagrams

- commandLine: ./helena_ref.sh
- inputLocation: $demoLocation/serpens/christian/data/helena/
- inputFiles: {inputLocation + "/helena_ref.xml", inputLocation + "/helena_ref.sh",inputLocation+"/helena.xsd",inputLocation+"/progen_ref.xml",inputLocation+"/progen.xsd",inputLocation+"/dp_ref.in",inputLocation+"/fd
- outputFiles: {"helena_ref.tar.gz","equilibrium.cpo.gz"}
- jalphallsaInputs: $demoLocation/serpens/christian/data/jalpha/
- jalphallsaCommand: ./jalpha.sh _PARAM_
- jalphallsaInputFiles: {jalphallsaInputs + "/jalpha.sh", jalphallsaInputs + "/jalpha.xsd", jalphallsaInputs + "/helena.xsd", jalphallsaInputs + "/JALPHA_WORKFLOW_GRID.tar.gz",jalphallsaInputs + "/ILSA_GRID.tar.gz", jalp
- jalphallsaOutputFiles: {"jalpha__PARAM_.tar.gz","ilsa__PARAM_.tar.gz"}
- jalphallsaMasterJobsLocation: $demoLocation/serpens/christian/.jalpha-ilsa-masterjobs
- jobIds: {}

Submit data:

- run scripts for HELENA reference run, 121 parametric HELENA runs, and 121 parametric ILSA runs

- XML input files (code specific parameters) for HELENA, PROGEN, JALPHA, and ILSA

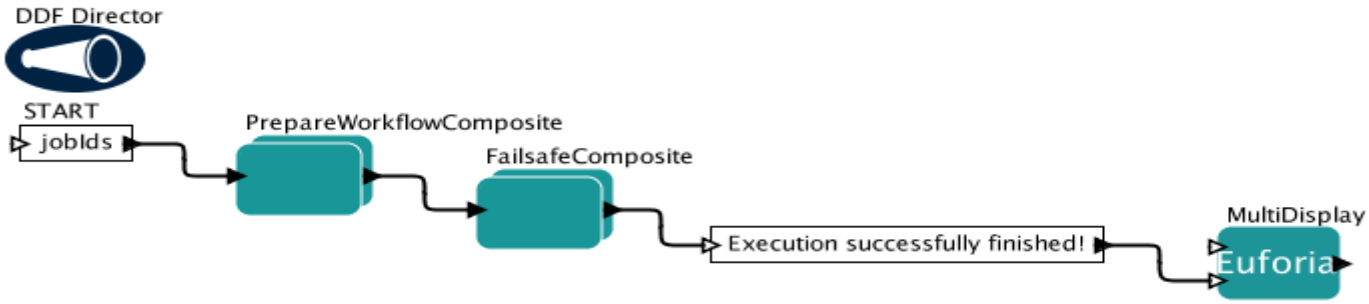
- XSD code files (W3C XML schemas) for HELENA, PROGEN, JALPHA, and ILSA

- input profiles (p', FF', boundary) for HELENA reference run

- equilibrium CPO from HELENA reference run

- executables

EUFORIA: j-α Stability Diagrams



PARAMETERS

You MUST change these

- jobs to check (NOTE: leave blank array {} to process one, last submitted job)

- jobIds: {}

You MUST check if these are correct

- 'demos/' directory location
- proxy file location
- output directory location
- RAS address

- ras: $ras_senecio
- demoLocation: $HOME
- proxyLocation: $demoLocation/serpens/core/cert/proxy
- outputLocation: $demoLocation/serpens/christian/output/HELENA-JALPHA-ILSA/
- isTunnelled: false

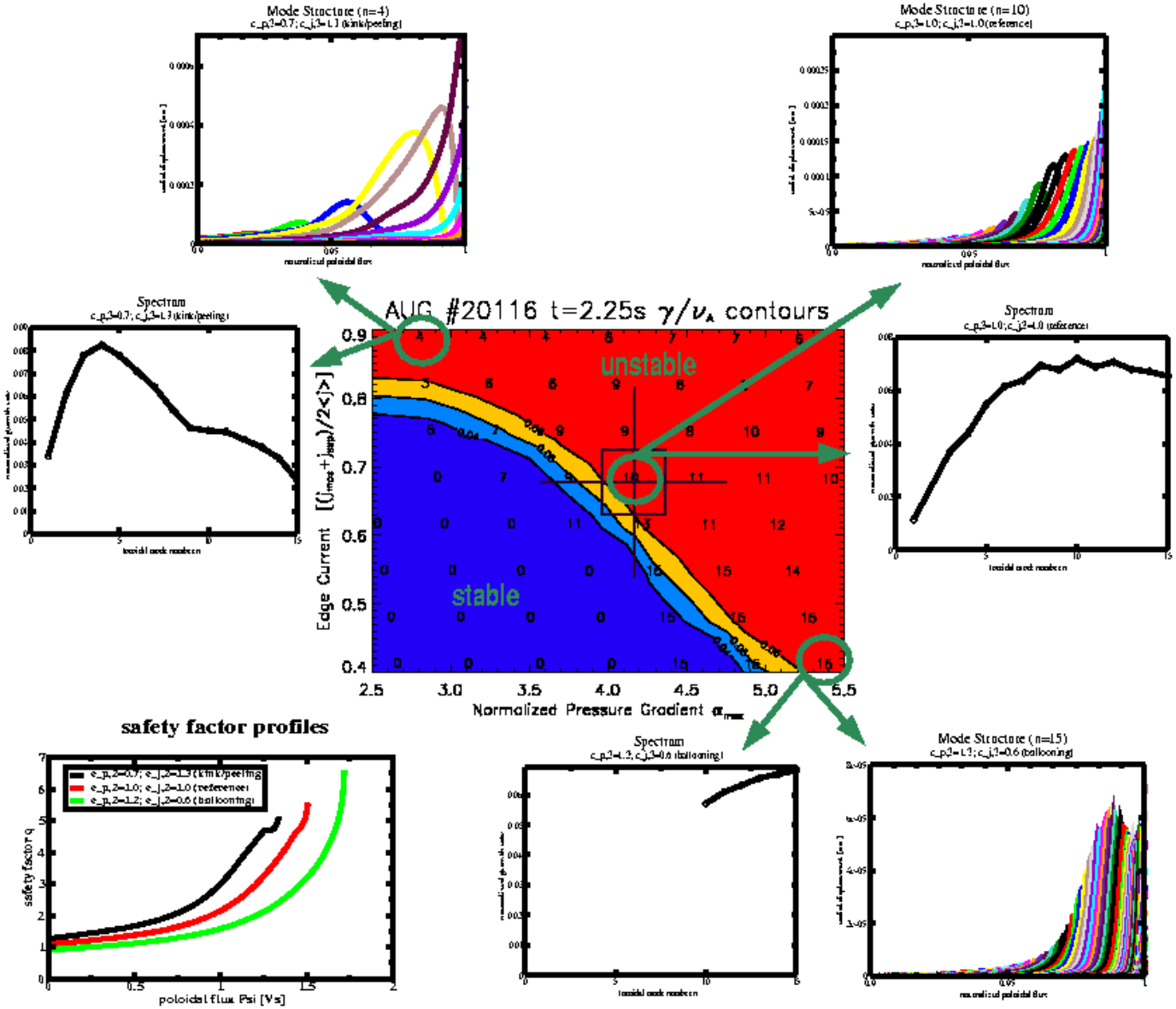
Leave these unchanged

- predefined RAS addresses
- tables' names in the internal database
- jobs' statuses counters
- file with main jobs' ids stored

- ras_balsa: http://balsa.man.poznan.pl:8080
- ras_cedrus: http://cedrus.man.poznan.pl:8080
- ras_senecio: http://senecio.man.poznan.pl:8080
- ras_stipa: http://stipa.man.poznan.pl:8080
- jobidsToCheck: next_to_check

Check status of runs and retrieve results

EUFORIA: j-α Stability Diagrams



Conclusion/ Future Plans

In 2010, IMP12 has entered the production phase.

Plans for 2011:

- Improve equilibrium reconstruction with EQUAL (MSE, kinetic profiles) – validation
- Extension to other tokamaks (Tore Supra, ASDEX Upgrade, MAST)
- Substitute HELENA and ILSA by CHEASE/ CAXE and KINX/ MARS (benchmarks, verification)
- Release candidate modules and release workflows
- Populate data base
- Free boundary equilibrium with feedback control (predictive mode): CEDRES++
- Additional free boundary modules: EQUINOX, FIXFREE

Plans for 201x:

- Linear MHD stability chain on all major European tokamaks as a standard analysis tool
- Web based linear MHD stability analysis
- Data base for parametric edge stability (input to transport code)