EFDA

EUROPEAN FUSION DEVELOPMENT AGREEMENT

Task Force
INTEGRATED TOKAMAK MODELLING

INTEGRATED SCENARIO MODELLING:
ISM news and coming events,
preparation to 2nd ISM working session
2013

I. VOITSEKHOVITCH and J. GARCIA

TF Leader : G. Falchetto
Deputies: R. Coelho, D. Coster
EFDA CSU Contact Person: D. Kalupin

1. **I. Voitsekhovitch and J. Garcia "ISM news and preparation to ISM working session 2013"**

DEMO modelling:

2. Introduction and METIS simulations by G. Giruzzi (15 min)

3. ASTRA/TGLF simulations by E. Fable (15 min)

4. COREDIV simulations by R. Zagorski (15 min)

5. NEMO/SPOT simulations by M. Baruzzo (15 min)

6. Sensitivity studies by T. Bolzonella (15 min)

7. JINTRAC simulations by L. Garzotti (15 min)

8. Conclusions + discussion by G. Giruzzi

ISM working sessions

- 1st ISM working session will take place 11-15 March at EFDA-Garching (joint with ITM CC)

- **2nd working session: 3-7 June, Cadarache, joint ISM - IO meeting on integrated modelling**

- **3rd working session: October, JET**

ITM Code Camps

> March 4 – 15, IPP-Garching (2nd week is joint with ISM WS)

> April 15 – 26, CIEMAT, Madrid

> July 8 – 19 (after EPS), Helsinki

> September 9 – 20, Ljubljana

> November 18-29, Lisbon

Provisional dates for ISM remote meetings in 2013

Regular remote meeting on Wednesday morning 10h30-12h00 EU time (09h30-11h00 UK time)

➢ 23 May: preparation to ISM WS, DEMO modelling

➢ 26 June (EPS rehearsals)

➢ Summer break: EPS, Code Camp, vacations ...

➢ 4 September (rehearsal for 14th Int. Workshop on Plasma Edge Theory in Fusion Devices, 23-25 September 2013, ISM-ACT1 preparation to 4th CC, ...)

➢ 25 September (rehearsal for 14th Int. Workshop on H-mode Physics and Transport Barriers, 2-4 October 2013)

Conferences/meetings:

➢ **40th EPS conference on Plasma Physics, July 1-5 2013, Espoo, Finland. Deadlines: 15th June (poster, oral), 2nd June (paper) – JET rehearsal (10 min. talk):**

➢ **Tuesday, 18 June:**

15:40h B. Baiocchi et al, "Turbulent transport analysis of JET H-mode and hybrid plasmas using QuaLiKiz TGLF and GLF23"

16:20h A. C. A. Figueiredo et al, "Progress in ETS modelling of JET hybrid scenarios"

16:30h P. Siren et al, "Current profile modelling in JET and JT-60U identity plasma experiments"

➢ **Thursday 20 June**

15:40h F. Köchl et al, "Integrated core + edge + MHD modelling of ELM mitigation at JET"

Conferences/meetings:

- ➢ **14th International Workshop on Plasma Edge Theory in Fusion Devices, Cracow, Poland, 23-25 September 2013**

  I. Ivanova-Stanik, F. Köchl et al, **Integrated core-SOL simulations of ITER H-mode scenario: effect of pedestal density on fusion performance and divertor loads**

- ➢ **14th International Workshop on H-mode Physics and Transport Barriers, Fukuoka, Japan , 2-4 October 2013.** **Abstract deadline: 16th June 2013**

- - **Dick Hogeweij et al Modelling of current ramp up / down**

- - **Jeronimo Garcia et al Comparison of JET/JT60U shots**

CEA:
Jeronimo Garcia
Xavier Litaudon
Benedetta Baiocchi
Vincent Basiuk
Philippe Huynh

CCFE:
Irina Voitsekhovitch,
Yuri Baranov
Luca Garzotti

DIFFER:
Dick Hogeweij
Jeroen van Dongen
Federico Felici

ENEA:
Silvana Nowak (5-7 June)

IPPLM:
Irena Ivanova-Stanik
Roman Stankiewicz

IST:
Antonio Figueiredo

ÖAW:
Florian Köchl

Swiss Confederation:
Olivier Sauter
Antoine Merle

EFDA-Garching:
Denis Kalupin

IO:
Alberto Loarte, Joe Snipes,
Simon Pinches, Alexei Polevoi,
S.-H. Kim (?)

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Act-1: ETS validation and application of ITM workflows to physics studies

a. Modelling of ITER scenarios with ETS workflows, based on the existing scenario developed with CRONOS, JETTO and ASTRA

V. Basiuk, J. Garcia, Ph. Huynh, X. Litaudon

b. Effect of NTM on transport and confinement in Hybrid Scenarios (JET, AUG, ITER)

S. Nowak, V. Basiuk, O. Sauter, A. Merle, Ph. Huynh

c. Core impurity transport and radiation in JET (C & ILW) and ASDEX-Upgrade (W wall)

Yu. Baranov, I. Ivanova-Stanik, D.Kalupin

d. Self-consistent (Te, Ti, ne, j) predictive modelling for JET plasmas with the ETS – contribution to EPS 2013

A. Figueiredo, J. Ferreira (remotely), D. Kalupin, V. Basiuk, Ph. Huynh

Act-2: Interpretative and predictive modelling for existing experiments

1. Turbulent transport analysis with **TGLF, QualiKiz, GLF23** for JET hybrids - <u>EPS 2013 contribution</u>.

   B. Baiocchi, J. Garcia

2. Comparison and modelling of JT-60U and JET plasmas in typical operational domains. Role of fast ions in hybrid scenarios.

   J. Garcia

3. Simulations of density profiles in JET hybrid discharges, GYRO simulations

   L. Garzotti, S. Moradi (remotely), I. Voitsekhovitch

4. Integrated core+edge+MHD modelling of ELM mitigation at JET - <u>EPS 2013 contribution</u>

   F. Köchl

5. JET current ramp up/down modelling, effect of W accumulation during the ramp up

   D. Hogeweij, F. Köchl

ACT3: Modelling for future experiments (ITER, JT-60SA)

1. Optimisation of ITER ramp up phase with RAPTOR code

   J. van Dongen, D. Hogeweij, F. Felici

2. Model-based real-time profile reconstruction, demonstration for a simulated ITER scenario

   F. Felici, J. van Dongen, D. Hogeweij

3. Integrated core-SOL simulations of ITER H-mode scenario: effect of pedestal density on fusion performance and divertor loads (contr. to 14th PET workshop)

   I. Ivanova-Stanik, F. Köchl, R. Stankiewicz, I. Voitsekhovitch, A. Polevoi

4. ITER scenario modelling with METIS (operational domain ...) including simulation of the real time control of the fusion burn.

   X. Litaudon

5. 1D JT-60SA scenario modelling. Predictive scenario modelling with transport models validated in ISM-ACT2

   J. Garcia, X. Litaudon

6. DEMO modelling using ITM Kepler workflows, in coordination with EFDA PPPT Work Programme (in collaboration with IMP3-ACT1-T9]

   C. Reux?

7. Four-field simulations for ITER HS, estimation of rotation with validated model. I. Voitsekhovitch, ...

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Monday 3 June Building 506, Salle de Maquettes		
10.00 - 10.10	Welcome, local information	J. Garcia
10.10 - 10.20	Agenda, work programme	I. Voitsekhovitch
10.20 – 10.50	Status of WEST modelling	C. Bourdelle
10.50 – 11.10	Coffee break	
11.10 - 11.40	Impact of W on current ramp-up phase in JET and ITER	D. Hogeweij
11.40 - 12.10	Real-time reconstruction, control and optimization of plasma profiles using the RAPTOR code	F. Felici
12.10 – 12.30	Application of RAPTOR to the ITER ramp up (to be confirmed)	J. van Dongen
12h30 - 13h30	Lunch	
13h30 - 18h00	Working session. ETS_A training for ACT1 team. Coffee break at 15.30.	

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ISM WS June 3-7, CEA-Cadarache: agenda

Tuesday 4 June Building 506, Salle de Maquettes		
9.00 - 12.00	Working session	
12.00 - 13.00	Lunch	
13.00 - 18.00	Working session	

Wednesday 5 June Building 506, Salle de Maquettes		
9.00-12.00	Working session	
12.00 – 13.00	Lunch	
13.00-18.00	Working session	

Time for the morning and afternoon coffee breaks to be confirmed

Thursday 6 June Building 506, Salle de Maquettes		
9.00 – 12.00	Working session. Coffee break at 10.30	
12.00 – 13.00	Lunch	
14.00 – 16.05	Joint ISM – IO meeting. Topics: - *density simulations and density effects on plasma performance* *- impurity simulations* *- plasma control*	
16.05 – 16.25	Coffee break	
16.25 – 18.00	Working session	

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14. 00 – 14.05	Introduction	I. Voitsekhovitch, J. Garcia
14.05 – 14.30	ITER modelling needs	A. Loarte
	ISM talks (physics model, numerical tool, main results)	
14.30 – 14.40	Particle transport with theory-based models	J. Garcia
14.40 – 14.50	Pellet fuelling for ITER	L. Garzotti
14.50 – 15.00	Core-SOL modelling of ELM mitigations (JET)	F. Köchl
15.00 – 15.10	Core-SOL ITER H-mode modelling including impurity	I. Voitsekhovitch
15.10 – 15.20	Current ramp up in ITER: density & impurity effects (tbc)	D. Hogeweij
15.20 – 15.30	RAPTOR capabilities for plasma control for ITER (tbc)	F. Felici
	Status of integrated modelling tools	
15.30 – 15.45	Status of IO modelling tools	S. Pinches
15.45 – 15.55	Status of ETS	D. Kalupin
15.55 – 16.05	Discussion of ISM actions for ITER modelling	All

Friday 7 June, 9.00-13.00: reports from ISM working session
Building 506, Salle de Maquettes

ACT1: Modelling of JET Hybrid scenarios with the European Transport Solver (EPS 2013 contribution)	A. Figueiredo, D. Kalupin
ACT1: Effect of NTM on transport and confinement in Hybrid Scenarios	S. Nowak, V. Basiuk, O. Sauter, A. Merle, P. Huynh
ACT1: Status of impurity modelling with ETS	Yu. Baranov, I. Ivanova - Stanik, D. Kalupin, R. Stankiewicz
ACT1: Modelling of ITER scenarios with ETS WFs, based on the existing scenario developed with CRONOS, JETTO and ASTRA	V. Basiuk, X. Litaudon, P. Huynh
ACT2: Modelling of JT-60U and JET plasmas in typical operational domains. Role of fast ions in hybrid scenarios	J. Garcia
ACT2: Turbulent transport analysis with TGLF, QualiKiz, GLF23 for JET hybrids (EPS 2013 contribution)	B. Baiocchi
Coffee break	

ISM WS: June 3-7, CEA-Cadarache: agenda

Friday 7 June, 9.00-13.00: reports from ISM working session Building 506, Salle de Maquettes	
ACT2: Simulations of density profiles in JET hybrid discharges	L. Garzotti
ACT2: Integrated core+edge+MHD modelling of ELM mitigation at JET (EPS 2013 contribution)	F. Köchl
ACT2: JET current ramp up/down modelling	D. Hogeweij
ACT3: Optimization of the ITER ramp-up phase with RAPTOR	J. van Dongen
ACT3: Model-based real-time profile reconstruction, demonstration for ITER scenario	F. Felici
ACT 3: Integrated core-SOL simulations of ITER H-mode scenario: effect of pedestal density (14th PET workshop)	I. Ivanova-Stanik, F. Köchl, R. Stankiewicz, I. Voitsekhovitch
ACT 3: ITER scenario modelling with METIS including the real time control of the fusion burn	X. Litaudon
ACT3: Progress in DEMO simulations with Kepler WF?	C. Reux
ACT3: Progress in JT-60SA modelling	J. Garcia
ACT3: Progress in four-field simulations for ITER HS	I. Voitsekhovitch
Closing Working session	I. Voitsekhovitch, J. Garcia