



EFDA

EUROPEAN FUSION DEVELOPMENT AGREEMENT

Task Force  
INTEGRATED TOKAMAK MODELLING

*Remote meeting, 12 Oct 2011*

**INTEGRATED SCENARIO MODELLING,  
Introduction  
meeting 12 October 2011**

**Presented by X LITAUDON & I  
VOITSEKHOVITCH**

TF Leader : G. Falchetto  
Deputies: R. Coelho, D. Coster

EFDA CSU Contact Person: D. Kalupin

# Agenda

- 1) Introduction, general information X. Litaudon**
- 2) ITER Modelling L to H transition during ramp-down (ITPA presentation for the IOS group ) V. Parail**
- 3) Update on current ramp-up modelling (ITPA presentation for the T&C group) I. Voitsekhovitch**

## **Remote meeting**

**Regular remote meeting on Wednesday morning  
10h30-12h00 CET (09h30-11h00 GMT) :**

- **07 Sept**
- **28 Sept.**
- **12 Oct.**
- **26 Oct. ?**
- **23 Nov.**
- **14 Dec.**

## 2011 ISM Working session

- **First ISM working session 07 March - 11 March**
- **Second ISM working session 04-08 July FOM**
- **Third: Culham from Monday 7 (10am) to 11 Nov (14 pm)**
  - **Local Host** [irina.Voitsekhovitch@ccfe.ac.uk](mailto:irina.Voitsekhovitch@ccfe.ac.uk)
  - **Tuesday 08 Nov afternoon: joint ISM-TF E1 meeting on modelling**
  - **Wed 09 or Thursday 10 Nov at 5pm : remote session from USA with Ph Snyder on EPED modelling for JET and ITER**
  - **Remote session from Japan on JET-JT-60U modelling ( visit of J Garcia)**
  - **invitation letter for mobility support, could you tell us by the 17 October !**

**2011 ISM Working session**  
**Tuesday 08 Nov afternoon: joint ISM-TF E1 meeting**  
**on modelling (agenda proposed E. joffrin)**

1. Goal and motivation for the meeting: E. Joffrin:
2. Ex-2.1.2 and Ex-2.1.4: C. Challis & P. Lomas
3. Ex-2.1.3: D. Frigione
4. Ex-2.1.5 and Ex-2.3.2: B. Bucalossi & F. Rimini
5. Ex-2.1.7: J. Mailloux
6. Ex-2.3.1 : J. Hobirk
7. Ex-2.2.1 and Ex-2.2.2: J. Coenen and R. Dux
8. Ex-1.3.2 and Ex-2.2.3: G. Maddison and P. Monier-Garbet
9. Ex-3.2.1: C. Maggi
10. Ex-2.2.5: A. Huber
11. Summary and link with edge modelling: E. Joffrin & M. Groth

- Each talk should not exceed 12' + 8' questions/discussion

**Format of the talk:**

- Experiments goals and deliverables
- Timeline details: number of sessions, dates,
  - Strategy for the experiment
  - Modelling activity foreseen for the preparation of the experiment
  - Modelling activity foreseen for the interpretation of the experiment
  - Key questions that scenario (integrated) modelling need to address
  - Key questions in connection with edge modelling if any.
  - Modelling issues requiring code development

**2012**

- **to send out the ITM 2012 Call for Proposal by end of October !**
- **Oct 2012**
  - **Define the 2012 ISM tasks and team**
  - **Contact us urgently for comments and proposals**

## 2012 ACTIVITY-1 Support Validation

<p>Thermal transport: benchmarking of new modules for transport coefficients and heating and current drive sources</p>	<p>Providing the benchmark cases (ASTRA, CRONOS, JETTO) for NCLASS and GLF23 transport models, CRONOS run for comparison with GRAY (ECRH) module, ETS-TRANSP benchmarking of <math>\alpha</math> heating and neutron yield.</p>	<p>IMP3, IMP4, IMP5</p>
<p>Particle transport: benchmarking of new modules for main species and impurity</p>	<p>ETS/impurity – SANCO benchmarking for Be (<b>and W?</b>). Providing ASTRA and JETTO runs for benchmarking of the neutral model for main species. SANCO run for benchmarking the neutral module for impurity. Providing the JETTO runs with pellet module. Providing ASTRA simulations with multiple main ion species</p>	<p>IMP3, AMNS, IMP5</p>

## 2012-ACT-1 Support physics Studies with ETS

Effect of NTM on transport and confinement in Hybrid Scenarios	Deployment of the ETS WF with NTM module for JET or ASDEX-U discharges: estimation of island width and comparison with measurements, transport simulations.	IMP3, IMP12, IMP5
Edge MHD analysis for Hybrid Scenarios (JET, ASDEX-U)	Application of the ITM WF for the pedestal MHD analysis for JET and ASDEX-U Hybrid Scenarios. s- $\alpha$ stability diagram	IMP12
Current diffusion during the ohmic current ramp up on existing devices (JET, MAST)	Interpretative simulations of the current diffusion for different collisionality levels and comparison to neoclassical prediction	IMP3, IMP12, IMP4
Predictive (Te, Ti, current diffusion, NBI, etc.) modelling of Hybrid Scenarios (JET, ASDEX-U) and comparison to experimental data	Predictive simulations using the Bohm-gyroBohm model, NCLASS and NBI heating module. ETS prediction for Te and Ti will be compared to measurements	IMP3, IMP5



## 2012- Activity-2

<p>Modelling of density evolution self-consistently with current diffusion and temperatures, validation of first principle transport models (TGLF, QualiKiz)</p>	<p>The density modelling of limited number of JET and ASDEX-U discharges using GLF23, TGLF and Bohm-gyroBohm models. Stability analysis and transport modelling with QualiKiz code. Current ramp down modelling including the H to L transition</p>	<p>IMP4</p>
<p>Comparison and modelling of JT-60U and JET plasmas in typical operational domains (signed Proposal Document Sheet EU11-02)</p>	<p>Compare performance and characteristics of the JET and JT-60U plasmas. Predictive and interpretative simulations of the same discharges.</p>	
<p>Current diffusion and transport modeling: JET – ASDEX-U and ITPA database</p>	<p>Current diffusion in JET, ASDEX-U and ITPA database Transport modelling of JET – ASDEX-U identity experiments</p>	
<p>Momentum transport in hybrid scenario: JET and ITPA database</p>	<p>Modelling of momentum transport in JET hybrid scenarios using the GLF23 and empirical models.</p>	

## 2012-ACTIVITY-3

<p>ITER hybrid scenario modelling</p>	<ol style="list-style-type: none"> <li>1. Current diffusion and transport modeling during the current ramp down phase</li> <li>2. Predictive density modeling with first principle models, density peaking effect.</li> <li>3. Development of real time model-based profile control (q-profile)</li> <li>4. Expansion of the operational domain with q on-axis below one by controlling the sawtooth period and avoiding NTMs</li> </ol>	
<p>1-D JT-60SA scenario modelling</p>	<p>Implementation of the JT-60SA H&amp;CD configuration (NBI, ECRH) in EU transport codes. Predictive scenario modelling with transport models validated in ACT2</p>	
<p>Modelling for DEMO</p>	<p>First OD modelling using simplified system code based on Kepler workflow</p>	<p>IMP 3</p>