

3. PARTICIPATION ON THE USE OF THE JET FACILITIES BY THE EFDA ASSOCIATES

3.1. Introduction

The participation of the Association EURATOM/IST on the use of the JET facilities by the EFDA Associates will include activities in the areas of operation, scientific exploitation, performance enhancements and management.

3.2. Operation

In the frame of JOC positions:

- Dr. Sébastien Hacquin will work in the LIDAR and Microwave Diagnostics Group. His activity will be mainly focussed on: (i) operation and maintenance of the KG3, KG8b reflectometry diagnostics; (ii) collaboration in the upgrade of the X-mode swept frequency KG8a reflectometer; and (iii) data validation and analysis of the KK3 (ECE) and reflectometry diagnostics;
- Dr. Isabel Nunes will work in the Plasma Operation Team, in the planning of the experiments and as Session Leader during the campaigns.

3.3. Scientific exploitation

The participation on the JET 2006 work programme is foreseen to include contributions from seventeen scientists (four of them as session leaders), related to their participation in experimental campaigns (C15-C17) at the JET site. The work will be mainly focussed on developments and physics studies related with task forces M, S1, S2, T, D and E.

The following main activities are foreseen:

- *Task Force M (plus support to S1, S2 and T)*
 - Maintenance and validation of the database related to fast MHD phenomena, namely of sawtooth data from new regimes (as the high Beta plasmas) and with ICRH;
 - Scientific co-ordination of experiments in the area of “Redistribution of NBI fast ions in the presence of TAE modes” and “Resonance condition for Alfvén cascades (AC) excitation”;
 - Processing of pulses with the MHD codes IDBALL and MISHKA and the interpretative code JETTO, on the request of the task forces;
 - Use of observed TAE and fishbone activity as a diagnostic for central q-profile evolution, requiring EFIT q-profile analysis with MSE and polarimetry constrains and modelling of q between sawtooth using the codes JETTO and CRONUS;
 - Continuation of the improvement of the JETTO code, by implementing the Porcelli's ITER sawtooth mode and partial reconnection model, namely to study sawtooth crash effects;

- Improvement of the edge stability physics in JETTO by using alternative models for peeling and ballooning marginal stability, benchmarked against parametric stability scans with MISHKA;
 - Study of the changes in the fast particles distribution caused by fishbone bursts and TAEs, using new JET diagnostics recently installed;
 - Use of numerical codes to study the sawteeth instability and analysis of the interplay between different instabilities: sawteeth, fishbones and TAEs interacting with the same population of fast ions;
 - Studies on the prevention of runaway electron generation at disruptions in JET as part of the development of disruptions mitigation techniques in reactor-scale;
 - Further investigation of the role of super-thermal and runaway electrons in internal reconnection events and at ITB regimes in JET;
 - Study of the triggering of NTMs by mode coupling using saddle coils to create an error field;
 - Studies on the double tearing mode activity with special emphasis on both the linear and nonlinear stability and on the MSE data analysis;
 - Study of Quiescent H-mode (QHM) discharges, using MISHKA for the stability and JETTO for transport modelling, to understand the differences between the edge stability in JET and the QHMs in ASDEX Upgrade and DIII-D (in collaboration with General Atomics, U.S.A.);
 - Further studies of Chirping modes, using the improved time-frequency visualization of the Choi-Williams distribution;
 - Localization of Alfvén cascades from combined O-mode and X-mode reflectometry measurements;
 - Study of the turbulence behaviour during ITB formation and of the link between the level of turbulence and the poloidal rotation velocity;
- *Task Force T*
- Continuation of the predictive modelling of impurity seeding experiments with JETTO / SANCO (for the core), including the coupling with the code EDGE2D (for the edge plasma);
 - Continuation of the study of the influence of the growth of NTM islands on energy and particle transport, by implementing in JETTO a code to simulate the additional transport due to islands;
 - Continuation of the TRANSP analysis to model the NBI fast ions affected by NTMs.
- *Task Force D (plus support to E and M)*
- Participation in turbulence and MHD studies using KG8b and KG3 reflectometry systems. Benefits for the physics studies are foreseen from the new microwave access upgrade for reflectometry and ECE;

- Reinstallation of the KG8a, X-mode broadband swept reflectometer (in the range 50-75 GHz) aiming at providing density profiles with high spatial and temporal resolution at the edge; the study of the impact of ELMs on the profiles is foreseen (to be compared with results from ASDEX Upgrade);
 - Exploitation of the MSE system plus MHD analysis with the equilibrium reconstruction EQUINOX for combined polarimetry/MSE measurements at JET (in collaboration with CEA, Cadarache);
 - Assessment of the possibility of using the MSE diagnostic for sawtooth real-time control;
 - Test of a new probe head designed to study turbulence driven momentum transport;
- *Task Force E*
- Detailed study of the SOL parameters dependence on the pedestal quantities for plasmas optimised for reciprocating probe measurements (high clearance discharges);
 - Continuation of the comparison of turbulence properties in forward and reverse field configurations;
 - Study of the radial transport as a function of time and space across the SOL during ELMs;
 - Determination of the cross-field heat and particle fluxes to the main chamber plasma facing components.

3.4. Enhancements

Concerning the JET-EP project, the Association EURATOM/IST will be in charge of the following contracts:

- Participation on the commissioning of the MPRu diagnostic (JW5-OEP-IST-18).
- Refurbishment of the old-mode reflectometer (kG8a) (JW5-OEP-IST-19).

Presently, IST is discussing new contracts in the areas of data acquisition for the neutron diagnostics, real-time plasma control and fast wave reflectometer.

3.5. Management

The Association EURATOM/IST foresees a similar participation on the JET management to that of the year 2005.