



EFDA

EUROPEAN FUSION DEVELOPMENT AGREEMENT

Task Force
INTEGRATED TOKAMAK MODELLING

Remote meeting, 27 October 2010

**INTEGRATED SCENARIO MODELLING,
report from ITPA-IOS meeting 18-21 Oct
2010, Seoul (modelling aspects)**

Presented by X LITAUDON

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

EFDA CSU Contact Person: D. Kalupin

Report - modelling aspects

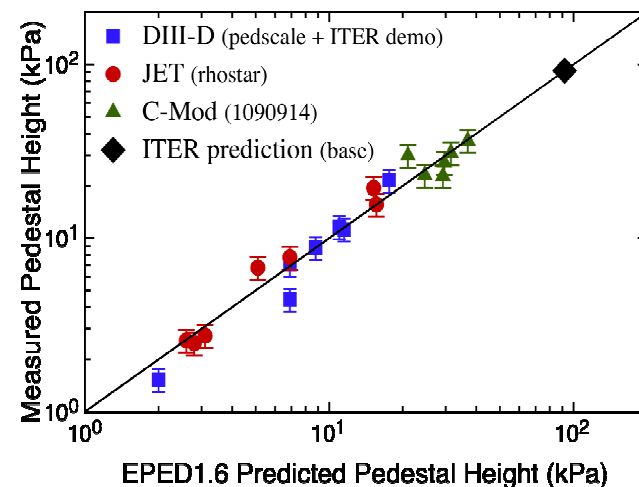
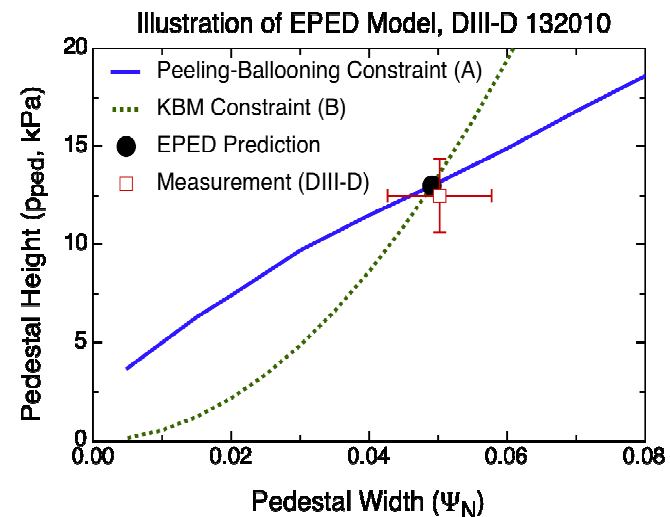
- **Major progress with EPED for the pedestal prediction. EPED should be used for ITER modeling (action on ISM group).**
 - X L has contacted Ph Snider at the ITPA: if we ask for some ITER prediction of pedestal parameters, Ph Snider could give the prediction. EPED code is not yet at a stage for time dependent core /pedestal modeling for ISM.
- **JM Park : DIII-D Ip ramp-up data submitted to ITPA database. Modelling using theory based model (ONETWO)**
- **C. Angioni: Difficulties to simulate with GLF23 plasma during AUG current ramp at low Ip: this is explained since at low Ip , the // dynamics is dominant like in the plasma edge where GLF23 fails.**

Edge Localised Modes - Pedestal

THS/1-1 Snyder

Snyder

- **Combining peeling/ballooning and KBM stability → height and width of the pedestal Snyder**
- **EPED prediction used for ITER SS and hybrid modelling : Kessel**



Hybrid scenario development – C. Kessel

Using Tokamak Simulation Code (TSC) free-boundary and PTRANSP prescribed boundary transport evolution codes

Hybrid Scenario:

$I_p \sim 12.5$ MA (11.5-13.5)

$n/n_{Gr} \sim 0.85$

$q(0) \rightarrow 1$ @ end of I_p ramp

(other methods, timing of heating, L-H timing, I_p over-current, have not been examined)

EPED1 estimate: (P. Snyder)

$T_{ped} \sim 4.2$ keV @ $n_{ped} = 0.85 \times 10^{20} / m^3$

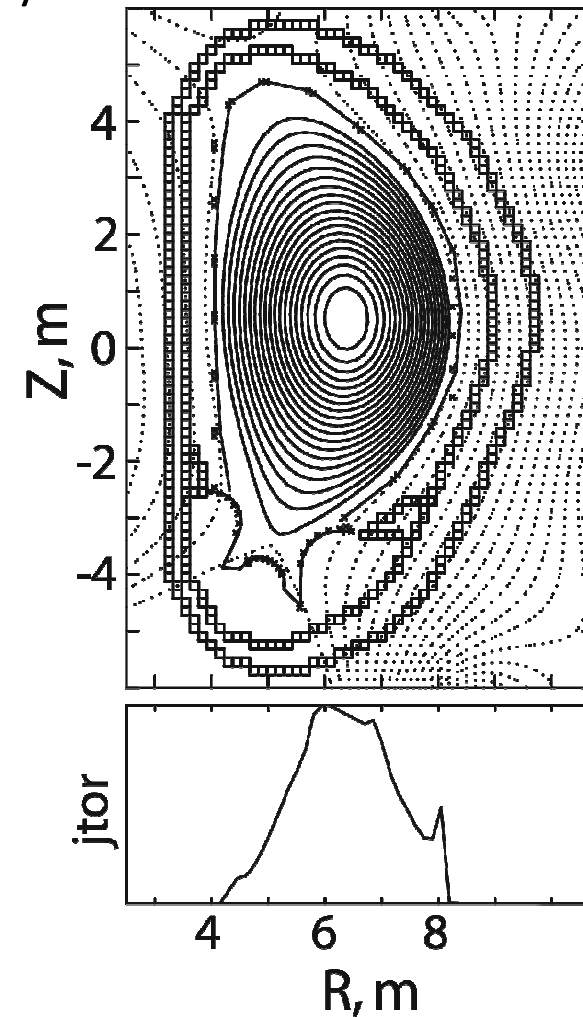
GLF23 gives $H_{98} \sim 1.25$

Impurities and radiated power:

2% Be

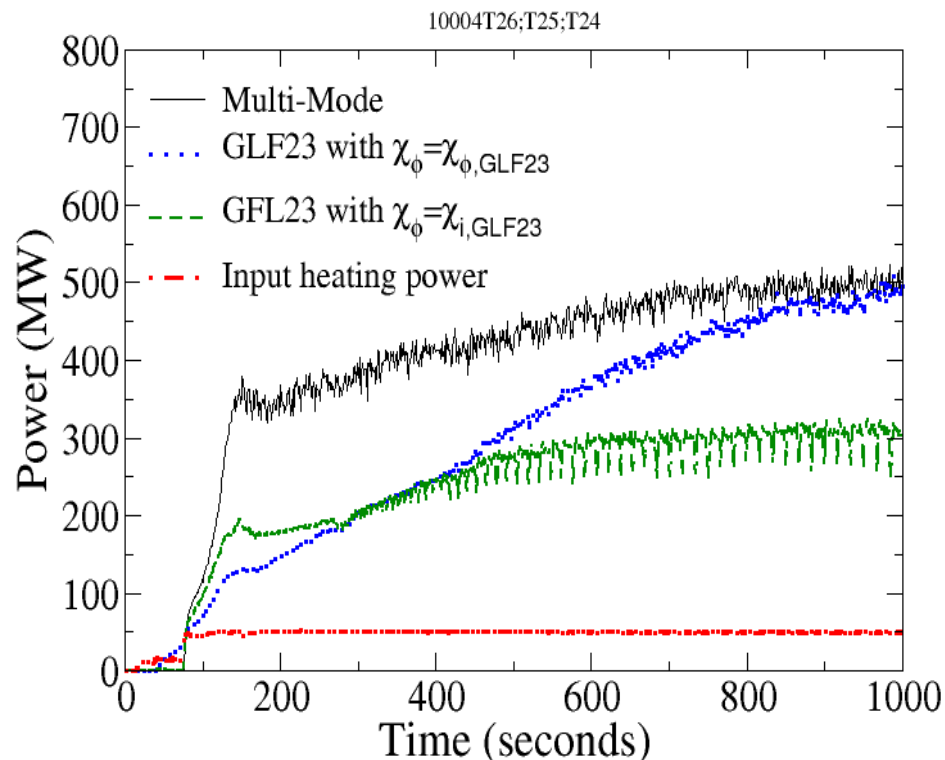
0.25-0.3% Ar

$P_{core,rad} \sim 35-45$ MW (brem+cyc+line)



Predicted Power and Fusion Q in Hybrid Scenario

- Hybrid scenario simulations: Fusion and input power vs time using Multi-Mode and GLF23 transport models
 - GLF23 model, including GLF23 prediction of momentum transport, yields nearly the same fusion power as the Multi-Mode transport model
- Both beams steered off-axis and IC Frequency is 48 MHz
 - $\omega = 30$ krad at $r/a = 0.8$



Transport Model	Q (1000 s)
GLF23 with $\chi_\phi = \chi_{i,GLF23}$	6.00
GLF23 with $\chi_\phi = \chi_{\phi,GLF23}$	9.88
Multi-Mode	10.00

KESSEL

Report - modelling aspects

- **A stronger emphasis on Joint Modelling activity**
- **8 Joint modeling activities have been proposed**
 - Joint modeling on existing current database for current ramp-up/down: C. Kessel is the spoke person.
 - Joint modeling on ITER baseline & ramp-down simulation for baseline : V. Parail is the spoke person.
 - Joint modeling on ITER rampup simulation for Hybrid & Steady-state : C. Kessel spoke person.
 - Joint modeling on hybrid benchmark: G. Giruzzi spoke person
- **Joint modelling activities organised as joint experiments**
- **Spokes person should prepare proposal in a similar format as joint experiment before the next CC meeting Deadline for submitting the proposal: 12 nov. 2010.**
- **Major progress done on code/code benchmarking**
 - cf G. Giruzzi presentation on the benchmark for the hybrid scenario

Report - modelling aspects

- **Real time control aspects have a growing importance for ITER-IO.**
 - A pragmatic approach is to start on a very precise task defined by ITER-IO

- **The slides shown during the meeting will be available on the ITER website:**
<https://portal.iter.org/departments/FST/ITPA/IOS>

- **Next ITPA-IOS group 11-14 April, Culham**

- **G. Sips is proposed as the new chairman of IOS group for 2012**