

## **13<sup>th</sup> INTERNATIONAL STELLARATOR WORKSHOP**

### **Transient behaviour in the plasma core of TJ-II stellarator and its relation with rational surfaces**

T. Estrada, E. de la Luna, J.A. Jiménez, E. Ascasíbar, B. Brañas, A. Cappa, F. Castejón, I. García-Cortés, J. Herranz, C. Hidalgo, A. López-Fraguas, F. Medina, B. Van Milligen, M. Ochando, I. Pastor, M.A. Pedrosa, J. Sánchez, F.L. Tabarés, D. Tafalla, V. Tribaldos, A. Varias<sup>1</sup>.

*Laboratorio Nacional de Fusión por Confinamiento Magnético. Asociación Euratom-CIEMAT, Madrid, Spain  
1 Dpto. Física Aplicada I, Universidad de Málaga, Málaga, Spain*

A transient behaviour is observed in the plasma core of TJ-II stellarator with fast negative pulses in the electron temperature. Changes from hollow to flat density profile are observed synchronised with the temperature drops. These experimental results have been obtained in plasmas using 300 kW of Electron Cyclotron Heating, with a power density of  $15 \text{ W/cm}^3$ , line-averaged electron density of  $n_e = 0.5 - 1 \cdot 10^{13} \text{ cm}^{-3}$  and central electron temperature of  $T_e = 1 \text{ keV}$ .

The transient behaviour resembles both, the electric pulsation discovered in CHS [1,2] and the “electron root” feature reported by W7-AS team [3,4].

In our experiments, it has been observed that the control parameter for the appearance of this pulsated behaviour is the value of the plasma current and that this value depends on the specific magnetic configuration.

A notable property of TJ-II is its considerable flexibility with regard to the magnetic configuration. The rotational transform can be varied over a wide range by changing the current fed into the coil structure. From the results obtained during the magnetic configuration scans carried out in TJ-II, we infer that the transient behaviour is connected with the presence of a rational surface close to the plasma centre. This result is supported by the equilibrium calculations performed with the VMEC code, in which the modification in the rotational transform profile due to the plasma current ( $I_p < 1 \text{ kA}$ ) is computed.

So far, this pulsated behaviour has been found related with the rational surfaces  $l/2 = 8/5, 3/2$  and  $5/4$ .

These results indicate that rational surfaces should play an important role in the modification of transport properties in the core of ECH plasmas.

[1] A. Fujisawa, H. Iguchi, H. Idei et al., Phys. Rev. Lett. **81** (1998) 2256

[2] A. Fujisawa, H. Iguchi, H. Idei et al., Plasma Phys. Control. Fusion **41** (1999) A561

[3] H. Maassberg, C.D. Beidler, U. Gasparino et al., Phys. Plasmas **7** (2000) 295

[4] U. Stroth, K. Itoh, S.I. Itoh, H.J. Hartfuss and H. Laqua. Phys. Rev. Lett. *In press*

Topic 2, Poster YES,

E-mail address: Teresa.Estrada@ciemat.es