Contribution ID: **3551** Type: **not specified**

P5.1011 L-mode plasmas analyses in view of realistic ramp-up predictions for JT-60SA and ITER

Friday, 12 July 2019 14:00 (2 hours)

See full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1011.pdf

Predicting plasma performance is an essential activity for assessing future campaigns in present day tokamaks as well as in future devices as ITER or JT-60SA. In particular, predictions for the ramp-up phase are of special importance, as successful plasmas in the flat-top phase critically depend on the initial configuration. This is particularly the case for the so-called advanced scenarios for which the plasma shape, flux consumption reduction or the control of the q profile during the ramp-up is mandatory [1-3]. However, the prediction and simulation of the plasma behavior during the ramp-up is a complex activity due to the combination of several challenges involving for instance, the lack of a heat transport model valid close to the separatrix or the inadequacy of neoclassical resistivity in the prediction of q profiles. Therefore a precise computation of the turbulent transport and current diffusion in L-mode is needed in order to accurately predict the q profile evolution in ECRH assisted ramp-ups.

In this contribution, L-mode analyses have been performed combining plasmas from different tokamaks in order to assess and to provide a credible modelling framework for the predictions of ramp-up phase for JT-60SA and the initial phase of ITER for which ECRH is planned to be used. We have compared two turbulent transport models (CDBM [4] and TGLF [5] in CRONOS [6]) in order to evaluate their predictive capabilities. To this end we have run simulations of the ramp-up phase in a JET plasma without auxiliary heating and in a flat-top L-mode TCV plasma with applied ECRH. Parameter scans in Zeff and in the edge electron temperature (within the experimental uncertainties) have been performed in order to assess the simulation sensitivity to these quantities. We have found a good prediction of the q profile and li evolutions in JET ramp-up if the edge electron temperature is well captured. Indeed our sensitivity scan showed a strong impact of the edge electron temperature on the q profile and li evolutions. In both tokamaks, results with CDBM showed better agreement with experimental measurements. Elements explaining the good prediction using this relative simple transport model and the impact for JT-60SA and ITER ramp-up will be given.

[1] Imbeaux et al. 2011 Nucl. Fusion
[2] Voitsekhovitch et al. 2010 PPCF
[3] Wakatsuki et al. 2015, PPCF
[4] Itoh et al. 1993, 1994, PPCF
[5] Staebler et al. 2005 Phys. of Plasmas
[6] J.-F. Artaud et al. 2010 Nucl. Fusion

This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 and 2019-2020 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.

Presenter: MORALES, J. (EPS 2019)

Session Classification: Poster P5

Track Classification: MCF