Contribution ID: **321** Type: **Poster**

Validation of global gyrokinetic simulations in stellarator configurations

Tuesday, 23 October 2018 08:30 (20 minutes)

In this contribution, recent simulations carried out in stellarator configurations with the global gyrokinetic code EUTERPE and the ongoing validation effort are presented.
The linear relaxation of zonal flows (ZFs) has been studied in global simulations in many stellarator configurations. The code has been verified by comparing results with both other gyrokinetic codes and analytical estimations. Furthermore, these calculations were validated against experimental measurements obtained during pellet injection experiments in TJ-II. The oscillatory relaxation of potential measured by the HIBP was compared to simulations including impurity ions, with a good quantitative agreement in the frequency and damping rates. This is the first experimental confirmation of the ZF oscillation in stellarators, accurately described by the linearized gyrokinetic equation.
The electrostatic micro-instabilities have been studied numerically in the stellarators TJ-II and W7-X and an effort to validate simulations against experimental turbulence measurements from Doppler Reflectometry (DR) has been done. The model validation has been pursued at different levels of detail, including the density fluctuation level, frequency spectra, and the localization of instabilities along the flux surface.
In dedicated experiments in TJ-II, the power and deposition location of the ECRH heating were changed, thus modifying significantly the density and temperature radial profiles. The experimental measurements from the DR system in TJ-II have been compared to simulations. The relevant wave-numbers and the radial variation of experimental density fluctuations spectra are consistent with the range of unstable wave-numbers and the location of maximum instability found in simulations. No dependency of the power spectra with the bulk ion mass is observed experimentally, which is consistent with the kind of unstable modes (electron-driven) found in simulations. A systematic difference is found between the density fluctuation spectra measured by the DR system at poloidally separated positions on the same flux-surface, which is largely affected by the rotational transform. The localization of instabilities in simulations is also influenced by the rotational transform, however, a discrepancy between the location of maximum fluctuation level in simulations and experiments is found so far.

Country or International Organization

Spain

Paper Number

EX/P1-11

Primary author: Dr SÁNCHEZ, Edilberto (Laboratorio Nacional de Fusión, CIEMAT)

Co-authors: ALONSO, Arturo (Laboratorio Nacional de Fusión, CIEMAT); Dr CALVO, Ivan (Laboratorio Nacional de Fusion, CIEMAT); Dr RIEMANN, Joerg (Max-Planck Insitut für Plasmaphysik); Dr VELASCO, José Luis (Laboratorio Nacional de Fusión, CIEMAT); Dr GARCÍA-REGAÑA, José Manuel (Laboratorio Nacional de Fusión, CIEMAT); Dr KLEIBER, Ralf (IPP); Dr ESTRADA, Teresa (CIEMAT)

Presenter: Dr SÁNCHEZ, Edilberto (Laboratorio Nacional de Fusión, CIEMAT)

Session Classification: P1 Posters