Contribution ID: **665** Type: **Poster**

Effect of the EC torque on slow plasma rotation under central ECH/ECCD for NTM onset

Wednesday, 19 October 2016 08:30 (4 hours)

The modification of low toroidal plasma rotation under application of central EC power injection with possible onset of neoclassical tearing modes (NTM) is an important issue for plasma confinement and for future devices (ITER will be characterized by a low rotation). In low collisionality regime and PEC/Poh >1 TCV experiments central co-ECCD was observed to modify the toroidal plasma rotation both in absence and at the appearance of 3/2 and 2/1 modes, while no modes with cnt-ECCD were observed.

The rotation profiles were promptly modified by the central EC power deposition and driven towards the plasma current direction as also observed in similar recent TCV experiments in the framework of the EUROfusion MST1work package. Dedicated MST1 discharges for this study were also done on ASDEX Upgrade and analysis is still ongoing.

The understanding of the physical mechanisms acting on the modification of the toroidal plasma rotation can allow the avoidance of the NTM onset and of the loss of confinement. The torques associated with the rotation changes have been generally not associated to a direct action of the EC power absorption, because the EC heating and current drive do not transfer momentum.

The toroidal rotation evolution under the effect of EC injection was simulated using a simplified model including an effective momentum diffusivity, scaled on the anomalous ion heat diffusivity, and an effective EC source term describing the effect of the torque due to possible different mechanisms.
The physical origin of the torque associated with the EC power absorption in low collisionality regime for PEC/Poh >1, can be associated to different causes such as driven turbulent effects or mechanisms of particles pump-out or based on the asymmetry in the power deposition.

In this work the change of rotation under the central EC power injection is investigated using the momentum balance equation and considering these different mechanisms for the interpretation of the experimental results.

We consider torque associated to the turbulent effects for the absorption of the EC power related to the enhancement of the turbulent Reynolds stress, torque related to the recycling phenomena at the edge and the occurrence of the EC pump-out and non-vanishing torque driving the toroidal rotation and provided by the surface-averaged displacement current .

Paper Number

TH/P3-16

Country or International Organization

ITALY

Primary author: Dr NOWAK, Silvana (IFP-CNR)

Co-authors: Dr MORO, Alessandro (IFP-CNR); Dr KARPUSHOV, Alexander (Swiss Plasma Center); Dr DUVAL, Basil (Swiss Plasma Center); Dr SOZZI, Carlo (IFP-CNR); Dr MARINI, Claudio (Swiss Plasma Center); Dr BRUNETTI, Daniele (IFP-CNR); Dr TESTA, Duccio (Swiss Plasma Center); Dr FABLE, Emiliano (IPP); Dr LAZZARO, Enzo (IFP-CNR); Dr PUCELLA, Gianluca (Centro Ricerche Frascati); Dr REIMERDES, Holger (Swiss Plasma Center); Dr STOBER, Joerg (IPP); Dr MARASCHEK, Marc (IPP); Dr REICH, Matthias (IPP); Dr PREYNAS, Melanie (Swiss Plasma Center); Dr SAUTER, Olivier (Swiss Plasma Center); Dr BURATTI, Paolo (Centro Ricerche Frascati); Dr MCDERMOTT, Rachael (IPP); Dr GARAVAGLIA, Saul (IFP-CNR); Dr FIETZ, Sina (IPP)

Presenter: Dr NOWAK, Silvana (IFP-CNR)

Session Classification: Poster 3

Track Classification: THC - Magnetic Confinement Theory and Modelling: Confinement