Contribution ID: **8** Type: **Poster**

ECCD effect on the Helitoron J and LHD plasma stability

Wednesday, 4 September 2019 15:15 (15 minutes)

The aim of the study is to analyze the stability of the Energetic Particle Modes (EPM) and Alfven Eigenmodes (AE) in Helitron J and LHD plasma if the electron cyclotron current drive (ECCD) is applied. The analysis is performed using the code FAR3d that solves the reduced MHD equations describing the linear evolution of the poloidal flux and the toroidal component of the vorticity in a full 3D system, coupled with equations of density and parallel velocity moments for the energetic particle (EP) species, including the effect of the acoustic modes. The Landau damping and resonant destabilization effects are added via the closure relation. The simulation results show that the n=1 EPM and n=2 Global AE (GAE) in Heliotron J plasma can be stabilized if the magnetic shear is enhanced above a given threshold, due to a decrease of the rotational transform at the magnetic axis caused by a ctr-ECCD injection. In addition, the simulations mimicking the effect of a co-ECCD injection also indicate a stabilizing effect on the EPM/GAE, caused by an enhancement of the magnetic shear due to an increase of the rotational profile at the magnetic axis. The stabilization of the n=1 EPM/GAE and n=2 Toroidal AE (TAE) in LHD discharges with ctr-ECCD injection is caused by an enhancement of the continuum damping in the inner plasma. Nevertheless, if the NBI injection intensity (EP β) is large enough to overcome the continuum stabilization, the growth rate of the unstable EPM/AE is larger in the simulations for a ctr-ECCD discharge.

Country or International Organization

Japan

Primary authors: VARELA, Jacobo (National Institute for Fusion Science); Prof. NAGASAKI, Kazunobu (Kyoto University); NAGAOKA, Kenichi (National Institute for Fusion Science); YAMAMOTO, Satoshi (QST); SPONG, Donald (Oak Ridge National Laboratory); Prof. GARCIA, Luis (University Carlos III of Madrid); CAPPA, Álvaro (Laboratorio Nacional de Fusión CIEMAT); WATANABE, Kiyomasa (National Institute for Fusion Science); Mr AZEGAMI, Akira (University of Nagoya)

Presenter: VARELA, Jacobo (National Institute for Fusion Science)

Session Classification: Poster

Track Classification: Control of Energetic Particle Confinement