

Contribution ID: 114

Type: Poster

# Non-linear MHD modelling of Edge Localized Modes dynamics.

Tuesday, 18 October 2016 08:30 (4 hours)

The non-linear MHD modelling of full ELM crash dynamics was performed using JOREK code for KSTAR pulse parameters and compared to the ECEI diagnostic observations. Some experimentally observed trends were reproduced in modelling. In particular the localization of the peeling-ballooning modes in the pedestal region inside the separatrix, the most unstable modes toroidal numbers and structures, poloidal velocity and the direction of the modes rotation are similar to the experimental observations on KSTAR. The rotation of the modes in electron diamagnetic direction is more common observation in many tokamaks due to the typically large negative radial electric field well in the pedestal region. However it was shown in JOREK modelling that at relatively large toroidal plasma rotation, which was the case for the KSTAR pulse modeled in the paper, the modes can rotate in the ion diamagnetic direction before ELM crash similar to KSTAR ECEI observations. Multi-modes (n=1-8) modelling demonstrated the acceleration of growth of the peeling-ballooning modes and even destabilization of previously linearly stable modes approaching the ELM crash due to the strongly increasing non-linear coupling at this stage of the instability. Moreover, a strongly sheared mean poloidal flow occurs on the non-linear phase of an ELM leading to the filaments detachment from the main plasma in the form of "blobs" which propagate in the SOL mainly in the ion diamagnetic direction. In/out divertor heat flux asymmetry (~2:1) due to ELM crash was obtained with two fluid diamagnetic drifts included in the modelling.

### Paper Number

TH/P1-24

### **Country or International Organization**

France

#### Primary author: Dr BECOULET, Marina (IRFM/CEA)

**Co-authors:** Mr LESSING, Alexandre (Max Planck Institute for Plasma Physics, Garching, Germany); Mrs PASSERON, Chantal (CEA, IRFM, 13108 Saint-Paul-Lez-Durance, France); Dr HUIJSMANS, Guido (CEA, IRFM, 13108 Saint-Paul-Lez-Durance, France); Dr YUN, Gunsu (Pohang University of Science and Technology, Pohang, Gyeongbuk 790-784, Republic of Korea); Dr MORALES, Jorge (2EPFL SB CRPP CRPP-TH, CH-1015, Lausanne, Suisse); Dr KIM, Minwoo (Ulsan National Institute of Science and Technology (UNIST), 44919, Ulsan, Republic of Korea); Mr FEVRIER, Olivier (CEA, IRFM, 13108 Saint-Paul-Lez-Durance, France); Dr PAMELA, Stanislas (CCFE, Culham Science Centre, Abingdon, UK); Mr GARBET, Xavier (CEA, IRFM, 13108 Saint-Paul-Lez-Durance, France)

Presenter: Dr BECOULET, Marina (IRFM/CEA)

## Session Classification: Poster 1

Track Classification: THS - Magnetic Confinement Theory and Modelling: Stability