Contribution ID: **607** Type: **Poster**

Influence of Magnetic Perturbations on Particle Pump-out in Magnetic Fusion Devices

Wednesday 15 October 2014 08:30 (4 hours)

Control of Type-I Edge Localized Modes (ELMs) is an important task for next step fusion devices like ITER. Following the results obtained on DIII-D resonant magnetic perturbations (RMPs) became a very popular tool to control plasma exhaust in tokamaks like ASDEX-Upgrade, MAST, KSTAR and probably ITER. RMPs produce a stochastic boundary which reduces the pressure gradients in the pedestal region allowing the suppression or mitigation of ELMs while keeping the outward transport enhanced. The density reduction in the pedestal area is a large contributor to reducing the pressure gradient below the peeling-ballooning stability limit. There were already several attempts both experimentally and theoretically to understand the interaction of magnetic perturbation with L-mode and H-mode plasmas, this work is aimed to summarize recent experimental results from ASDEX-Upgrade, DIII-D, KSTAR, MAST, NSTX, LHD and TEXTOR with resonant and non-resonant magnetic perturbations. In L-mode plasmas the influence on the edge and core plasma is typically more pronounced, when comparing to H-mode plasmas, what is attributed to much better coupling of non-axisymmetric perturbation with the plasma equilibrium. Recent MAST results show that the largest degree of pump-out coincides with the best alignment of the external field to the equilibrium field, which agrees with findings from TEXTOR. During H-mode discharges numerous experiments report changes in transport during phases where type I ELMs are mitigated (JET, DIII-D) or suppressed (ASDEX Upgrade, DIII-D, KSTAR) by external perturbations. As observed in ASDEX Upgrade, DIII-D and LHD the pump-out seems to depend on pedestal collisionality/density. Additionally on ASDEX-Upgrade depending on the spectrum of the magnetic perturbation one gets either reduction (for a non-resonant case) or increase (for a resonant case) of pedestal and central electron densities. This cannot be explained with increased frequency of mitigated ELMs as the particle losses per event decrease with ELM frequency as reported on ASDEX Upgrade, MAST and LHD.

Country or International Organisation

Germany

Paper Number

EX/P3-47

Author: Dr JAKUBOWSKI, Marcin (Max-Planck-Institut für Plasmaphysik)

Co-authors: Dr DINKLAGE, Andreas (Max-Planck-Institut für Plasmaphysik); Dr KIRK, Andrew (Culham Centre for Fusion Energy); Dr HIDALGO, Carlos (CIEMAT); Dr MCKEE, George R. (University of Wisconsin--Madison); CANIK, John (Oak Ridge National Laboratory); Dr TANAKA, Kenji (National Institute for Fusion Science); Dr SCHMITZ, Oliver (FZ Juelich); Dr EVANS, Todd E. (General Atomics); Dr SUTTROP, Wolfgang (Max-Planck-Institut für Plasmaphysik); Dr JEON, YoungMu (National Fusion Research Institute)

Presenter: Dr JAKUBOWSKI, Marcin (Max-Planck-Institut für Plasmaphysik)

Session Classification: Poster 3