Contribution ID: **15** Type: **Poster**

Trapped-electron modification of kinetic ballooning instabilities in general geometry

Within the gyrokinetic formalism, we present and analytically study the equations for an explicit treatment of the trapped-electron-modified kinetic ballooning mode (KBM) and the electromagnetic version of the trapped-electron mode (TEM),
in general geometry. The gradient of the plasma $\beta = 8\pi p/B^2$, the ratio of kinetic to magnetic pressure, is taken to be small enough to avoid including perturbations of the magnetic field strength.
Trapped-electron-modified KBMs are first described close to ideal magnetohydrodynamic marginality, retaining the explicit resonant contribution of both ions and trapped-electrons, and then in a strongly-driven fluid limit.
We highlight the role of trapped electrons and magnetic-field-line mode localisation in the electromagnetic corrections to the generalised Ohms's law.
Our results are general and provide new theoretical ground for the characterization of several magnetic confinement concepts, such as tokamaks, quasi-symmetric and quasi-isodynamic stellarators.
We prove that maximum-$\mathcal{J}$ devices (where $\mathcal{J}$ is the second adiabatic invariant) enjoy relatively good stability properties at finite β, but the coupling of trapped-electron and kinetic ballooning modes might induce modes rotating in the ion direction, thus eluding good maximum-$\mathcal{J}$ properties.
A mechanism for the destabilisation of the trapped-particles-enabled collisionless microtearing mode also is proposed.

Author: ZOCCO, Alessandro (Max-Planck-Institut f\”ur Plasmaphysik, Wendelsteinstra{\ss}e 1, D-17491 Greifswald, Germany)

Co-authors: Dr RODRIGUEZ, Eduardo (Max-Planck-Institut f\”ur Plasmaphysik, Wendelsteinstra{\ss}e 1, D-17491 Greifswald, Germany); Dr EDIMSTON, James (Rudolf Peierls Centre for Theoretical Physics, Parks Road Oxford OX1 3PU, United Kingdom)

Presenter: ZOCCO, Alessandro (Max-Planck-Institut f\”ur Plasmaphysik, Wendelsteinstra{\ss}e 1, D-17491 Greifswald, Germany)

Session Classification: Poster Session #1