

Modelling of the interaction between ELMs and fast-ions using MEGA

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Recent experimental observations reveal a strong interplay between edge localized modes (ELMs) and energetic ions in the pedestal region [1, 2]. The impact that this interaction between ELMs and fast-ions may have on the ELM itself, and its implications towards the development of a robust ELM control technique, is still unknown. For this reason, non-linear hybrid kinetic-MHD simulations of MHD stability in the presence of energetic particle effects have been carried out using MEGA [3]. A spontaneous ELM has been successfully obtained with the MHD module of MEGA in a fully 3D realistic X-point geometry. High- n ballooning modes dominate in standard MHD simulations, whereas diamagnetic effects mitigate high- n mode numbers, as expected and observed in AUG plasmas [4, 5]. Hybrid kinetic-MHD simulations using realistic on- and off-axis Neutral Beam Injection (NBI) fast-ion distributions are performed to investigate the effects of a net resonant wave-particle momentum and energy transfer on the ELM. The impact that these results have on present non-linear MHD models of ELMs will be discussed.

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