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Effect of resistivity on peeling-ballooning modes in low-aspect ratio tokamaks ANDREAS KLEINER, NATHANIEL FERRARO, Princeton Plasma Physics Laboratory, GUSTAVO CANAL, Instituto de Fsica, Universidade de So Paulo, AHMED DIALLO, Princeton Plasma Physics Laboratory — We find that non-ideal effects can significantly affect peeling-ballooning stability thresholds in NSTX discharges. In particular, robust resistive peeling-ballooning modes are found to exist well before the ideal peeling-ballooning stability threshold is met. These results may help explain why ideal-MHD theory often does not accurately describe ELM onset in spherical torus configurations. The peeling-ballooning model is widely adapted to describe macroscopic stability limits related to the edge pedestal in tokamaks. The onset of such modes is a constraint in the EPED model, which is successfully applied to conventional aspect ratio machines to predict the pedestal height and width, where an onset of ELMs can be expected. For spherical tokamaks however the existing (ideal-MHD) models do not always accurately describe experimental observations. For the first time we present a study of peeling-ballooning modes beyond ideal-MHD based on experimental plasma configurations. Employing the state of the art extended-MHD code M3D-C1, we explore the impact of non-ideal effects on the linear stability of macroscopic modes in the plasma edge region of ELMing NSTX discharges. The results present a valuable basis for the development of a predictive model for ELMs in low-aspect ratio tokamaks.

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