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Simulation of ELM Instabilities using Extended MHD[1] LINDA SUGIYAMA, M.I.T., H.R. STRAUSS, NYU, J.B. BRESLAU, PPPL, G.Y. PARK, NYU, M3D TEAM — Studies of ELM instabilities in the edge region of high temperature tokamaks have been carried out in realistic configurations, using the M3D initial value code. The simulations are intended to be combined with kinetic calculations, eg XGC, to study edge stability in fusion plasmas. MHD results for different scenarios, including DIII-D and ITER, are compared. Initial results for two-fluid effects will be presented. The near-vacuum region surrounding the plasma is modeled as a high resistivity, low density plasma, bounded by a rigid conducting wall at the vacuum vessel. Good initial equilibria and high spatial resolution in the affected region are essential for accurate modeling. The massively parallel M3D code can handle a large number of toroidal harmonics, with corresponding resolution in the poloidal plane. The spectrum can be studied and convergence accelerated by first enforcing toroidal periodicity at a given mode number n, then increasing the number of poloidal planes and independently decreasing the periodicity, finally feeding into the full simulation.

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