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The Effect of Anomalous Electron Viscosity on Magnetic Reconnection During ELMs[1] JOSHUA SAUPPE, CARL SOVINEC, UW-Madison, XUEQIAO XU, MAXIM UMANSKY, LLNL — Edge-localized modes (ELMs) allow rapid releases of particles and energy in a magnetically confined plasma. The initial linear evolution of an ELM is dominated by the ideal peeling-ballooning instability, after which non-ideal effects come into play [Snyder et. al., POP 12, 056115 (2005)]. Numerical simulations using the BOUT++ plasma edge code demonstrate that by including several non-ideal effects the simulated ELM size is consistent with experimental observations [Xu et. al., PRL 105, 175005 (2010)]. Anomalous electron viscosity limits the high radial wavenumbers k_r normal to the flux surfaces to facilitate magnetic reconnection; diamagnetic drifts limit the high toroidal modes n in the bi-normal direction. Using the BOUT++ code, we investigate the role that anomalous electron viscosity plays in the magnetic reconnection event and pedestal collapse by varying both the Lundquist number S and the dimensionless hyper-Lundquist parameter $\alpha_H = \eta_H/\mathrm{R}^2\eta$ where η_H is the anomalous viscosity. Comparisons to ELM simulations using the NIMROD plasma code with two-fluid effects are discussed.

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