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Is turbulence indeed reduced in the tokamak edge pedestal? Mysteries of pedestal poloidal asymmetries revealed[1] SILVIA ESPINOSA, PETER J CATTO, Plasma Science and Fusion Center (PSFC-MIT) — It has been suggested that the L-H transition involves the reduction of turbulence by sheared radial electric fields. For H-mode pedestals, neoclassical collisional theory may thus be expected to properly treat low order phenomena, such as flows. However, Alcator H-mode edge pedestals exhibit significantly stronger poloidal asymmetry than predicted by the most comprehensive neoclassical models developed to date. We propose a novel self-consistent neoclassical theoretical model that allows us to explain these poloidal asymmetries in boron temperature and density, and hence potential. First, impurity temperature asymmetries can be driven by inertial effects, which are significant when impurities are allowed to reach sonic speeds. Second, a much stronger impurity density in-out asymmetry than given by magnetic field variation can be introduced by the poloidally varying impurity diamagnetic drift. This asymmetry is achieved by allowing the diamagnetic drift contribution to be comparable to the poloidal and toroidal flows used to measure the radial electric field. In conclusion, we provide a more realistic predictive model for pedestal observations without the need to invoke anomalous transport.

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