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TH/P4-03: Numerical Modeling of Neoclassical Transport and Geodesic Acoustic Mode Relaxation in a Tokamak Edge

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The edge of a tokamak in a high confinement (H mode) regime is characterized by steep density gradients, and a large radial electric field. Recent analytical studies demonstrated that the presence of a strong radial electric field consistent with a subsonic pedestal equilibrium modifies the conventional results of the neoclassical formalism developed for the core region. In the present work we make use of the recently developed gyrokinetic code COGENT to numerically investigate neoclassical transport in a tokamak edge including the effects of a strong radial electric field. The results of numerical simulations are found to be in good qualitative agreement with the theoretical predictions and the quantitative discrepancy is discussed. In addition, the present work investigates the effects of a strong radial electric field on the relaxation of geodesic acoustic modes (GAMs) in a tokamak edge. We present numerical simulations demonstrating that the presence of a strong radial electric field characteristic of a tokamak pedestal can enhance the GAM decay rate, and provide the heuristic arguments elucidating this finding.

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