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Turbulent Transport in Presence of Magnetic Island OLIVIER IZACARD, CHRISTOPHER HOLLAND, University of California - San Diego, SPENCER JAMES, University of Tulsa, DYLAN BRENNAN, Princeton University

— Understanding the physics of both large-scale magnetohydrodynamic instabilities and small-scale drift-wave microturbulence is essential for predicting and optimizing the performance of magnetic confinement based fusion energy experiments. While both types of instabilities have been investigated individually for many years now, less attention has been given to quantifying the interaction mechanisms between them. We report progress on understanding these interactions using both analytic theory and numerical simulation, with BOUT++ [B. Dudson et al., Comput. Phys. Comm. 180, 1467 (2009)] used to evolve a simple four-field fluid model in a sheared slab geometry. This work focuses upon understanding the dynamics of the electrostatic ion temperature gradient instability in the presence of a background static magnetic island, as key parameters such as ion temperature gradient and magnetic gradients are varied. The simulation results are then used to calculate effective turbulent transport coefficients (e.g. viscosity, resistivity) that are compared against analytic predictions. As part of this work, a OMFIT module has been developed to enable execution of BOUT++ and post-processing on either local or remote systems.

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