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[**x**] Theory [ ] Experiment

Overlapping Electron and Ion Driftwave Instabilities In The Tokamak Edge,* G.M. Staebler, J.E. Kinsey, R.E. Waltz, *General Atomics* – Linear kinetic growth rate analysis shows that both ion and electron drift waves are typically unstable in overlapping wavenumber ranges in the outer third of tokamak plasmas. The implications of the presence of overlapping instabilities on transport will be explored at the quasilinear level with a new gyro-Landau-fluid (GLF) model. A new GLF model is needed in order to treat coupling between electron temperature gradient modes and ions. The new model presented here has both trapped and passing particles. The closure of the highest moments yields coefficients which are functions of the trapped particle fraction. These coefficients are fit by minimizing the error between the GLF response functions and the exact kinetic result. A model for the boundary between those trapped particles which can bounce average and those which can have a Landau resonance is developed. Using this bounce averaging fraction in place of the trapped fraction gives a GLF model which is valid over the full spectrum of drift-wave eigenmodes. The GLF model is solved as an eigenvalue problem so it can find subdominant instabilities. The relative contribution to the transport fluxes from the overlapping instabilities will be evaluated with the new model.

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