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Role of linearly damped eigenmodes in several two field turbulence models K.D. MAKWANA, P.W. TERRY, University of Wisconsin-Madison — Linearly damped eigenmodes have been shown to provide a significant finite-amplitude-induced energy sink for saturation in collision-less trapped electron turbulence(CTEM). Based on an analytic criterion, similar behaviour is predicted for seven other distinct fluid models in certain parameter regimes. These models (TEM, Rayleigh-Taylor, Local Resistive g-mode, Drift thermal, Micro-tearing with time dependent thermal force, Hasegawa-Wakatani and Ionization driven drift wave) are solved numerically and the solutions are projected onto the linear eigenmodes. The analytic criterion is explicitly evaluated for various parameter regimes and used to predict whether or not damped modes will significantly affect saturation. These regimes are investigated in the simulations and the predictions are verified by comparing stable mode amplitudes with unstable mode amplitudes in saturation. Fluxes are calculated and it is shown that quasi-linear flux overestimates the true flux whenever damped modes contribute significantly to saturation. This invalidates the quasi-linear approximation and shows that damped modes cannot be ignored in these models.

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