Gyro-Landau fluid equations for trapped and passing particles

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A new system of gyro-Landau fluid (GLF) equations for tokamak plasmas is presented. The new equations include both trapped particles, which can average the Landau resonance, and passing particles which do have a Landau resonance. The trap GLF (TGLF) model is unrestricted in trapped fraction or perpendicular wavenumber of the electrostatic perturbation. The linearly unstable eigenmodes of the TGLF equations include low frequency trapped ion modes all the way up to high frequency electron temperature gradient driftwaves. Extensive benchmarking of the linear TGLF eigenmodes with a large database of gyrokinetic linear stability calculations verifies that the TGLF model is accurate over the full range of plasma parameters tested.

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