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Impurity Turbulent Transport Studies using Gyro-Fluid Models WENDELL HORTON, XIANGRONG FU, WILLIAM ROWAN, Univerisity of Texas at Austin, SHIMPEI FUTATANI, SADRUDDIN BENKADDA, CNRS-Universite de Provence — We study particle turbulent transport using a set of three-component (electric potential ϕ, hydrogenic density δn_i and impurity density δn_z) gyro-fluid equations. Linear eigenmode analysis shows that at least three modes exist in this slab impurity model, with one stable mode, one unstable mode and a third intersting mode with zero frequency. Quasilinear particle flux for hydrogenic(impurity) gas is calculated from the out-of-phase ϕ and $\delta n_i(\delta n_z)$ fluctuations. The results agree with experimental observation of particle transport dependence on density gradient length. We also conduct 2D nonlinear gyro-fluid simulations with DTRANS code. Comparison between heavy impurities (eg. Argon) and light impurities (eg. Boron) show that heavy impurities have strong influence on the transport dynamics while light impurities are acting more like passive tracers. Turbulence growth from initial plasma states without hydrogenic plasma waves ($\delta n_i = \phi = 0$) and only a tiny injection of the impurity make clear the role of the impurity injection for drift wave dynamics.

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