

Vlasov simulation of the Rayleigh-Taylor instability

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The Rayleigh-Taylor instability (RTI) develops at an interface between two fluids with different densities when an external force is applied from a heavy fluid to a light fluid. In the previous studies of ideal MHD simulations, the RTI develops symmetrically in the horizontal axis. On the other hand, previous hall-MHD and Finite-Larmor-Radius (FLR)-MHD simulations have shown that the RTI develops asymmetrically in the horizontal axis. In this study, we perform four-dimensional Vlasov simulations of the RTI with two spatial dimensions and three velocity dimensions. We vary the ratio of the ion inertial length and/or the ion gyroradius to the spatial scale of the density gradient layer, and discuss the effect of the non-MHD effects on the growth of the RTI.

Keywords: Rayleigh-Taylor instability, Vlasov simulation, space plasma