



Three dimensional hybrid simulation of plasma mixing induced by the Kelvin-Helmholtz instability

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Kelvin-Helmholtz instabilities play an important role for plasma transfer and mixing at the Earth's magnetopause, in particular during northward IMF conditions. In this study we investigate the plasma mixing observed in a KH unstable shear layer by means of a three dimensional hybrid simulation. We setup the simulation using a two dimensional Grad-Shafranov equilibrium, so that the region around the equator is more KH unstable than the southern and northern regions at higher latitudes. We analyze the evolution of the three dimensional structure of the instability, along with kinetic ion signatures. Ion mixing is observed between the two plasmas, suggesting magnetic reconnection and/or diffusion processes are ongoing. We particularly analyze ion distributions at several locations in the instability to examine the consistency of ion kinetic signatures with the fluid and topological signatures of reconnection at various locations in the vicinity of the KH vortices.