# Non-linear coupling between magnetic reconnection and MHD-scale Kelvin-Helmholtz instability and the formation of the tail-LLBL

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We have performed two-dimensional two-fluid and full particle (PIC) simulations to investigate the role of MHD-sale Kelvin-Helmholtz Instability (KHI) on the formation of earth's Low-Latitude Boundary Layer (LLBL). The results from our two-fluid simulations including finite electron inertial effects have revealed that when the magnetic field components along the k-vector of the KHI are anti-parallel across the velocity boundary layer (anti-parallel case), the non-linear coupling between magnetic reconnection and KHI results in the plasma mixing across the velocity boundary layer. Such the plasma mixing can explain how the earth's tail-LLBL is formed. Two-fluid simulations, however, cannot explain the formation mechanism of dawn-dusk asymmetries in the ion energy spectrum for the LLBL. Thus, in this study we use full particle simulations of MHD-scale KHI for the anti-parallel case. This is the first study that investigates the coupling between magnetic reconnection and MHD-scale KHI using kinetic particle simulations.