Three-dimensional two-fluid simulations of MHD-scale Kelvin-Helmholtz vortices considering finite electron inertial effects

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We have performed three-dimensional two-fluid simulations including finite electron inertial effects to understand the structure of MHD-scale Kelvin-Helmholtz (KH) vortices. The results from our two-dimensional two-fluid simulations including finite electron inertial effects have revealed that magnetic reconnection induced by the flow of KH vortices is a crucial factor for determining the structure of KH vortices. Two-dimensional studies, however, are not sufficient for understanding the coupling between magnetic reconnection and KH vortices, because the plane with the KHI k-vector may be different from the plane where magnetic reconnection develops. Thus, in this study we perform three-dimensional two-fluid simulations including finite electron inertial effects to investigate how the MHD-scale KH vortices couple with magnetic reconnection in a three-dimensional space.