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Expected Observable Features of Three-Dimensional Turbulent Magnetic Reconnection from Kinetic Simulations

Takuma Nakamura, Yasuhito Narita, Rumi Nakamura, and Walfgang Baumjohann
Space Research Institute (IWF) / Austrian Academy of Sciences, Graz, Austria (takuma.tkm.nakamura@gmail.com)

We have analyzed data from 3D fully kinetic particle-in-cell (PIC) simulations of turbulent magnetic reconnection with and without a guide field. Recent 3D simulations demonstrated that for a strong guide field, the oblique, secondary tearing mode drastically disturbs the structure of the primary reconnection layer, while for a weak or no guide field, other instabilities such as the lower-hybrid drift instability or the drift kink instability can also disturb the reconnection layer. Based on 8 dimensional $(t, \vec{x}, \omega, \vec{k})$ analyses of the 3D PIC simulation data, we systematically investigate when and where each wave/instability occurs and how they develop and interact with each other. In this presentation, we will show these simulation results and discuss expected observable features of the turbulent reconnection process.