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Flux Rope Dynamics in 3D Kinetic Simulations[1] STEFANO MARKIDIS, High Performance Computing and Visualization (HPCViz) Department, KTH Royal Institute of Technology, GIOVANNI LAPENTA, KU Leuven, PIERRE HENRI, University of Pisa, HOMA KARIMABADI, University of California, San Diego, TOM INTRATOR, Los Alamos National Laboratory, ERWIN LAURE, High Performance Computing and Visualization (HPCViz) Department, KTH Royal Institute of Technology — The dynamics of multiple flux ropes is studied with three-dimensional Particle-in-Cell simulations. The initial plasma configuration is chosen to mimic the Earth's magnetotail environment. The evolution of the system with and without a uniform guide field Bg (1/3 the asymptotic magnetic field B0) is investigated. It is found that in both cases tearing instability rapidly occurs and generates several flux rope plasmoids, that rapidly grow in size coalescing. The magnetic field is characterized by the Hall quadrupolar structure with no guide field, while by a unipolar strong core magnetic field in guide field simulations. The interchange instability occurs on the reconnection fronts of multiple flux ropes in absence of guide field. Lower hybrid waves are present in both simulations: they appear early in simulations with no guide field, while later in time in simulations with guide field. The most intense electric fields ($\sim$ three times the reconnecting electric field) develop during the coalescing process in the contact point of merging flux ropes. These electric field are probably caused by the disruption of the Hall electric field configuration during the coalescence. The intense electric field at the contact point of flux ropes might lead to localized particle acceleration.

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Stefano Markidis
High Performance Computing and Visualization (HPCViz) Department,
KTH Royal Institute of Technology

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