

GEM リコネクションチャレンジのブラソフシミュレーション

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Vlasov code simulation of GEM reconnection challenge

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A two-and-half-dimensional and fully electromagnetic Vlasov simulation code is developed in which phase-space distribution functions are defined in five-dimensional position-velocity phase space (x, y, v_x, v_y, v_z) . The Vlasov equation in two-dimensional configuration and three-dimensional velocity spaces is solved with a non-oscillatory and conservative scheme, and the full set of Maxwell equations are self-consistently solved based on the standard Finite Difference Time Domain (FDTD) method. The Geospace Environment Modeling (GEM) magnetic reconnection challenge is chosen as a benchmark test of our two-dimensional Vlasov code. The result is compared with the past simulation results with Darwin-Vlasov, explicit and implicit particle-in-cell codes. The present simulation with a very-low spatial resolution gives a high growth rate of magnetic flux, which is in agreement with the results of the GEM reconnection challenge.