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Fluid-kinetic Simulation via Pseudo-Particle Method : 1D Non-linear Simulation of the Weibel instability SHUHEI NUMAZAWA, ZENSHO YOSHIDA, Graduate School of Frontier Sciences, The University of Tokyo — We developed a new numerical scheme, Pseudo-particle method, which can capture both fluid and kinetic aspects of plasmas in the single scheme. It enables us to simulate phenomena fluidically or kinetically by changing the property of pseudo-particles, due to the scale length of phenomena and the structure of phase space. Within the numerical scheme, we extend the Smoothed Particle Hydrodynamics (SPH) method and a numerical method for fluid plasma via pseudo-particle method is developed. This extension of SPH to two-fluid theory is firstly accomplished. Using the scheme, we simulated a nonlinear development of the Weibel instability in 1D configuration. We clarify the validity of fluid simulation via the extended SPH and the difference between fluid simulation and kinetic simulation using Particle in Cell method. Then we report how fluid simulation and kinetic simulation can be transited in the single scheme.

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