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Kinetic properties of the particle-in-cell simulation of a Lorentz plasma Y.R. LIN-LIU, Dept. of Physics, National Central University, Taiwan, T.Y. LIN, S.H. CHEN — The phenomenon of numerical thermalization in the standard particle-in-cell (PIC) simulation of Vlasov plasmas has been extensively studied at the early stage of its development [1] and was considered well understood. However, it was recently reported [2] that the well-established scaling law for the thermalization time could be compromised by the presence of an additional stochastic force acting on the particles, which is used to simulate collisional processes in a weakly ionized gas. In the present work, we are interested in the problem of electron-ion collisions in a fully ionized plasma. We investigate the thermal relaxation phenomenon in the PIC simulation of a Lorentz plasma in one dimension [3]. The pitch-angle scattering of the electrons by the stationary ion background is modeled by a Monte-Carlo algorithm. The numerical results obtained indicate that the thermal relaxation time is proportional to N_D (the number of particles per Debye length), and not N_D^2 as in the standard PIC simulations. Our results appear to complement those found by the previous study [2].

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