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Perturbative Particle Simulation Studies of Periodically Focused Intense Charged Particle Beams.¹ WEIHUA ZHOU, HONG QIN, RONALD DAVIDSON, Princeton Plasma Physics Laboratory, Princeton University, Princeton, NJ 08543 — High intensity charged particle beam propagation in a periodic focusing lattice is numerically studied. The beam equilibrium and dynamic behavior are described self-consistently by the nonlinear Vlasov-Maxwell equations. For a beam equilibrium which is inhomogeneous in the transverse direction, the solution to the Vlasov-Maxwell equations for periodic focusing configurations can only be determined numerically. To carry out this investigation, the Beam Equilibrium Stability and Transport (BEST) code which uses a 3D low-noise perturbative particle simulation method, has been extended. The scheme begins with a smooth-focusing lattice which is the smooth-focusing approximation for the periodic lattice, and adiabatically replaces the smooth-focusing lattice by the periodic lattice. With this approach, periodic solenoidal configurations are first investigated, and then periodic quadrupole configurations are studied.

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