Parallel Particle-In-Cell Simulation of High Intensity Beams

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In this paper, we will discuss about computational challenges and models in simulating the high intensity beams. The particle-in-cell approach together with the split-operator method is used for self-consistent high intensity, high brightness beam dynamics simulations. Numerical efficient methods to solve the 3D Poisson equation subject to different boundary conditions will be presented. Two parallel implementation methods of the particle-in-cell simulation will be compared and contrasted using state-of-art high performance computers.