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Merging for Complex Particle Kinetic modeling of multiple plasma beams (inter-penetrating flows)[1] ALEXANDER LIPATOV, GEST Center UMBC — We suggest a merging procedure for the Complex Particle Kinetic (CPK) model in case of inter-penetrating flow (multiple plasma beams). Each CPK macro-particle includes a Maxwellian distribution in velocity and Gaussian distribution in space with internal dynamics (see [Hewett, 2003], for details). It is assumed that an arbitrary distribution of real particles can be represented by such a superposition in phase space (moving–finite—-element approach) at least as well as could be done with the standard particle in cell (PIC)/Monte Carlo (MC) delta functions and their associated "shape factors". The CPK method allows us to provide a global simulation of the complex plasma objects on the Hall-MHD (fluid) scale (aggressive merging) with automatic incorporation of the kinetic/particle description of the particle-wave processes (aggressive fragmentation) where it is necessary. The CPK approximation works well for ions, electrons, dust grains and neutral components. This code was tested in the simulations for the study of the interaction of the plasma flow with comets and Io's atmosphere. In this report we examine the standard (PIC) and the CPK methods in the case of the particle acceleration by shock surfing. The plasma dynamics is described by a standard (particle-ion– fluid-electron) hybrid model. While a particle-mesh method is well enough verified approach, the CPK model seems to be a good approach in case of multiscale simulation which includes multiple subdomains with various particle/fluid plasma behavior.

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