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Hybrid Simulation of Ion Acoustic Waves Including Coulomb Collisions[1] BRUCE COHEN, ANDRIS DIMITS, Lawrence Livermore National Lab., RUSSEL CAFLISCH, C.M. WANG, YANGHONG HUANG, UCLA Math Department, GIACOMO DIMARCO, Univ. of Ferrarra — Kinetic simulation of collective phenomena including Coulomb collisions in inhomogeneous plasma presents significant multi-scale challenges. When the ratio of the collisional-mean-free-path of an ion or electron species to the local scale length of the plasma properties or the electromagnetic fields varies from very much greater than unity (kinetic limit) to very much smaller than unity (fluid limit) over a domain of interest, comprehensive simulation becomes difficult; and a brute-force, first-principles approach is typically impractical because of the severe computational stiffness of the underlying physics. This paper reports progress on the development of a kinetic-fluid hybrid technique for plasma simulation intended to address such multiple scale situations. A specific application to the simulation of ion acoustic waves including both Landau damping and Fokker-Planck Coulomb collisions is presented.

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