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Simulation of 2D Kinetic Effects in Plasmas using the Grid Based Continuum Code LOKI JEFFREY BANKS, Rensselaer Polytechnic Institute, RICHARD BERGER, TOM CHAPMAN, Lawrence Livermore National Laboratory, STEPHAN BRUNNER, COLE POLYTECHNIQUE FDRALE DE LAUSANNE — Kinetic simulation of multi-dimensional plasma waves through direct discretization of the Vlasov equation is a useful tool to study many physical interactions and is particularly attractive for situations where minimal fluctuation levels are desired, for instance, when measuring growth rates of plasma wave instabilities. However, direct discretization of phase space can be computationally expensive, and as a result there are few examples of published results using Vlasov codes in more than a single configuration space dimension. In an effort to fill this gap we have developed the Eulerian-based kinetic code LOKI that evolves the Vlasov-Poisson system in 2+2-dimensional phase space. The code is designed to reduce the cost of phase-space computation by using fully 4th order accurate conservative finite differencing, while retaining excellent parallel scalability that efficiently uses large scale computing resources. In this poster I will discuss the algorithms used in the code as well as some aspects of their parallel implementation using MPI. I will also overview simulation results of basic plasma wave instabilities relevant to laser plasma interaction, which have been obtained using the code.

Jeffrey Banks
Rensselaer Polytechnic Institute

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