Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

KEEN and KEEPN wave simulations from 2D to 4D[1] MICHEL MEHRENBERGER, U. Strasbourg, FR, BEDROS AFEYAN, Polymath Research Inc., DAVID LARSON, LLNL, NICOLAS CROUSEILLES, U. Rennes, FR, FERNANDO CASAS, Universitat Jaume I, SP, ERWAN FAOU, U. Rennes, FR, ADILA DODHY, ERIC SONNENDRUCKER, IPP, Garching, DE, MAGDI SHOUCRI, IREQ, Varennes, CA — We show for well-driven KEEN (Kinetic Electrostatic Electron Nonlinear) waves and their analogs in pair plasmas KEEPN (Positron) waves, how the dynamics is captured in a variety of complimentary numerical approaches. Symplectic integration and quadrature node based techniques are deployed to achieve satisfactory results in the long time evolution of highly nonlinear, kinetic, non-stationary, self-organized structures in phase space. Fixed and composite velocity grid arbitrary-order interpolation approaches have advantages we highlight. Adaptivity to local phase space density morphological structures will be discussed starting within the framework of the Shape Function Kinetics (SFK) approach. Fine resolution in velocity only in the range affected by KEEN waves makes for more efficient simulations, especially in higher dimensions. We explore the parameter space of unequal electron and positron temperatures as well as the effects of a relative drift velocity in their initial conditions. Ponderomotively driven KEEPN waves have many novelties when compared to KEEN waves, such as double, staggered, vortex structures, which we highlight.

[1]Work supported by the AFOSR and OFES

Bedros Afeyan
Polymath Research Inc.

Date submitted: 20 Jul 2015 Electronic form version 1.4