

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

WAKES: Wavelet Adaptive Kinetic Evolution Solvers¹ MARINE MARDIRIAN, BEDROS AFEYAN, Polymath Research Inc., DAVID LARSON, LLNL — We are developing a general capability to adaptively solve phase space evolution equations mixing particle and continuum techniques in an adaptive manner. The multi-scale approach is achieved using wavelet decompositions which allow phase space density estimation to occur with scale dependent increased accuracy and variable time stepping. Possible improvements on the SFK method of Larson are discussed, including the use of multiresolution analysis based Richardson-Lucy Iteration, adaptive step size control in explicit vs implicit approaches. Examples will be shown with KEEN waves and KEEP (Kinetic Electrostatic Electron Positron Nonlinear) waves, which are the pair plasma generalization of the former, and have a much richer span of dynamical behavior. WAKES techniques are well suited for the study of driven and released nonlinear, non-stationary, self-organized structures in phase space which have no fluid, limit nor a linear limit, and yet remain undamped and coherent well past the drive period. The work reported here is based on the Vlasov-Poisson model of plasma dynamics.

¹Work supported by a grant from the AFOSR

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Date submitted: 14 Jul 2016

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