

Abstract Submitted  
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**A kinetics-only delta-f (KODF) method for modeling warm plasma waves**<sup>1</sup> THOMAS JENKINS, DAVID SMITHE, Tech-X Corp — A new delta-f particle-in-cell method, kinetics-only delta-f (KODF), is presented. In conventional delta-f methods, perturbations around a known analytic equilibrium are modeled; statistical noise is reduced since the particles model only perturbations and not the equilibrium itself. In KODF, we generalize this concept to incorporate cold linear plasma waves into the known (quasi)analytic plasma behavior. The perturbations modeled by KODF PIC methods are thus nonlinear, finite-temperature perturbations atop cold linear waves whose evolution can be modeled without the noise associated with a PIC model. We demonstrate the implementation of KODF in the VSim particle-in-cell code. VSims semi-implicit FDTD methods [D. N. Smithe, PoP 14, 056104 (2007)] are used to model the fluid behavior of cold plasma waves, and source terms that arise from these waves (e.g., from gradients of cold current or charge densities, or from quasilinear terms) appear in the KODF weight evolution equation to drive and evolve responsive warm plasma effects. We explore the noise-reduction capabilities of the KODF algorithm and its ability to model waves of interest in RF heating scenarios (e.g. mode-converted IBWs).

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