Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Variational Principles for Nonstationary States of the Vlasov-Poisson System P.J. MORRISON, University of Texas at Austin, B. AFEYAN, Polymath Research Inc, V. SAVCHENKO, Polymath Research Inc — Variational principles are used for studying nonstationary steady states of the Vlasov-Poisson system [1]. Our motivation is to understand the creation and long time stability properties of nonstationary steady states, motivated by recently discovered Kinetic Electrostatic Electron Nonlinear (KEEN) waves [2]. Unlike BGK modes, which are stationary, we seek steady states where the particles interact with a multiple-harmonic self-consistent nonstationary field via a sequence of trapping, detrapping, and retrapping transitions. While KEEN waves were discovered [2] by driving a Maxwellian plasma with a ponderomotive force caused by the beating of two laser beams [2,3], the variational formulations allow the investigation of other mechanisms that might lead to such states, besides a single mode drive of finite temporal duration or a Maxwellian initial state. Criteria for initial states and external fields that lead to nonstationary states can be obtained with variational procedures and reduced descriptions derived from it. [1] P.J. Morrison, Phys. Plasmas 12, 058102 (2005); H. Ye and P.J. Morrison, Phys. Fluids 4B, 771 (1992). [2] B. Afeyan et al., Proc. IFSA (Inertial Fusion Sciences and Applications 2003, Monterey, CA), 213, B. Hammel, et al., eds., Am. Nuc. Soc. (2004). [3] M. Mardirian et al., Savchenko et al., and Kline et al., this conference. Work Supported by the DOE SSAA Grant DE-FG03-03NA00059.

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Date submitted: 22 Jul 2005 Electronic form version 1.4