Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Kinetic Simulations of Electron Plasma Waves: trapped electron filamentation and sideband instabilities[1] STEPHAN BRUNNER, Ecole Polytechnique, Lausanne, Switzerland, R.L. BERGER, J.W. BANKS, B.I. COHEN, T. CHAPMAN, J.A.F. HITTINGER, W. ROZMUS, D.J. STROZZI, Lawrence Livermore National Laboratory, Livermore, CA 94551, B.J. WINJUM, University of California, Los Angeles, CA 90095, E.J. VALEO, PPPL, Princeton, NJ 08540 —
Kinetic simulations of nonlinear electron plasma waves (EPW) are presented in 2D with the Vlasov code LOKI (2 space and 2 velocity dimensions; Banks et al., Phys. Plasmas 18, 052102 (2011)). Propagating EPWs are created with an external wave potential with uniform transverse amplitude. The evolution of the plasma wave field and its self-consistent quasi-steady distribution of trapped electrons is studied after the external drive is turned off. For finite-amplitude EPWs, the onset of the trapped-electron-induced filamentation instability (H. Rose, Phys. Plasmas 15, 042311 (2008)) and trapped electron sideband instability (S. Brunner and E. Valeo, PRL 93, 145003 (2004)) are studied as a function of wave amplitude and $k_0\lambda_{De}$, where k_0 is the wavenumber of the external potential. We extend the theory of Kruer *et al* PRL **23**, 1969 to 2D to find growth rates of both instabilities and compare these to the ones obtained from the simulations. In the nonlinear state, the distribution of resonant electrons is dramatically modified

[1]This work was performed under the auspices of the U.S. Department of Energy by Lawrence LLNL under Contract DE-AC52-07NA27344 and funded by the Laboratory Research and Development Program at LLNL under project tracking code 12-ERD-061.

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Date submitted: 18 Jul 2012 Electronic form version 1.4