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Electron Heating by Plasma Waves[1] E.G. EVSTATIEV, B.A. SHADWICK, Department of Physics and Astronomy, University of Nebraska – Lincoln — Lagrangian fluid plasma simulations show that when a test electron moves with the plasma wave, its phase space trajectory appears to be random. The average momentum of a collection of test electrons changes with the plasma wave, but their momentum dispersion is very small or zero. Similar simulations are done with a multiwave plasma model.[2] When the initial electron velocity is low compared with the phase velocity of the plasma wave, similar results to the fluid simulations are observed. When the electron velocity is close to the phase velocity of the plasma wave and wave-particle resonance becomes important, the momentum dispersion of the electrons is no longer small and indicates electron heating and trapping. These results may help understand the significance of an initial electron velocity spread (temperature) for electron trapping in laser-plasma experiments as well as the effects of numerical particle heating (such as in particle-in-cell simulations) in laser-plasma simulations.

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[2]T. M. O'Neil, J. H. Winfrey, and J. H. Malmberg, Phys. Fuids **14**, 1204 (1971); E. G. Evstatiev, P. J. Morrison, and W. Horton, Phys. Plasmas **12**, 072108 (2005).

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