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A numerical investigation of Landau damping by bounce-resonant particles with initial-condition effects GRANT W. HART, ROSS L. SPENCER, BRYAN G. PETERSON, Brigham Young University — There is very little damping by particles which are velocity-resonant with an electrostatic wave in a nonneutral plasma because they remain in resonance only until they bounce off the end. The time spent in turning around dephases the particle from the wave. Bounce-resonant particles, on the other hand, which have a higher midplane velocity which compensates for the turn-around time, remain coherent with the wave in an average sense and cause damping of the wave.[1] We have built a Particle-In-Cell (PIC) simulation that models a damped wave in a nonneutral plasma. In this simulation we can cut off the distribution function at an arbitrary velocity. As the cut-off velocity is passed through the resonant velocity, the change in plasma behavior demonstrates the effect of that group of plasma particles on the damping of the wave. Certain particles change from damping to anti-damping as they change their phase relative to the wave in the resonant region. The frequency of the wave changes by about 2% as the cut-off velocity passes through the resonance, much larger than expected from the change in the charge in the plasma. These and similar effects will be discussed.

[1]M. E. Koepke, Bull. Am. Phys. Soc., 49, 40 (2004).

Grant Hart
Brigham Young University

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