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Numerical Simulation of Driven Electron Acoustic Waves.[1] F. VALENTINI, D.H.E. DUBIN, T.M. O'NEIL, UCSD — Eulerian and PIC code simulations of the electron acoustic wave (EAW) are presented. This novel, low amplitude, BGK wave has the approximate dispersion relation $\omega \simeq 1.3\,\bar{v}_e k$, where $\bar{v}_e$ is the electron thermal velocity and the wave number k is assumed to be small (i.e., $k\lambda_D \ll 1$).[2] Within linear theory, the wave is heavily Landau damped, but the damping does not occur for a BGK wave since the electron distribution is flat (i.e., $\partial f_e/\partial v = 0$) in the immediate vicinity of the phase velocity. Simulations of a collisionless plasma show that an EAW is excited by a low amplitude resonant driver if the driver is applied over a long enough time (several trapping periods). When collisions are included in the simulation, successful excitation requires a sufficiently large driver amplitude. The trapping period for the driver must be short compared to an effective collision time–the time for small-angle Coulomb scattering to produce velocity diffusion over the width of the trapped-particle plateau.

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[2]J.P. Holloway and J.J. Dorning, Phys. Rev. A **44**, 3856 (1991).

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