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Numerical Simulation of Driven Electron Acoustic Waves.[1] F. VALENTINI, Univ. of Calabria, D.H.E. DUBIN, T.M. O'NEIL, UCSD — Electron-acoustic waves (EAW's) are nonlinear modes that can exist even at low amplitude.[2] Within linear theory, EAW's would be heavily Landau damped because the wave phase velocity is comparable to the electron thermal velocity ($\omega \approx 1.3 k \mathrm{v}_{\mathrm{th}}$). However, the nonlinearity (trapped particles) effectively turns off Landau damping. This paper uses Eulerian and PIC simulations to investigate the excitation and stability of EAW's.[3] Successful excitation occurs when a relatively low amplitude driver field is applied resonantly for a sufficiently long time (many trapping periods). The excited EAW rings at nearly constant amplitude long after the driver is turned off, provided that the EAW has the longest wavelength that fits into the simulation domain. Otherwise, the EAW decays to a longer wavelength EAW. In phase space, this decay to a longer wavelength EAW appears as a merger of the vortex-like trapped particle distributions. In recent experiments with pure electron plasma columns (see poster by Kabantsev and Driscoll), EAWs were successfully excited at the predicted resonant frequency, and the predicted decay to longer wavelength was observed.

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[2]J.P. Holloway and J.J. Dorning, Phys Rev A **44** 3856 (1991).
[3]F. Valentini, T.M. O'Neil, D.H.E. Dubin, Phys Plas **13** 052303 (2006).

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