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Electron Acoustic Waves in Pure Ion Plasmas

F. ANDEREGG, M. AFFOLTER, C.F. DRISCOLL, T.M. O’NEIL, UCSD, F. VALENTINI, U. Calabria (Italy) — Electron Acoustic Waves (EAWs) are the low-frequency branch of near-linear Langmuir (plasma) waves: the frequency is such that the complex dielectric function \( D_r, D_i \) has \( D_r = 0 \); and “flattening” of \( f(v) \) near the wave phase velocity \( v_{ph} \) gives \( D_i = 0 \) and eliminates Landau damping. Here, we observe standing axisymmetric EAWs in a pure ion column. At low excitation amplitudes, the EAWs have \( v_{ph} \approx 1.4 \bar{v} \), in close agreement with near-linear theory. At moderate excitation strengths, EAW waves are observed over a range of frequencies, with \( 1.3 \bar{v} < v_{ph} < 2.1 \bar{v} \). Here, the final wave frequency may differ from the excitation frequency since the excitation modifies \( f(v) \); and recent theory analyzes frequency shifts from “corners” of a plateau at \( v_{ph} \). Large amplitude EAWs have strong phase-locked harmonic content, and experiments will be compared to same-geometry simulations, and to simulations of KEEN waves in HEDLP geometries.

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