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Degenerate Mixing of Electrostatic Modes on a Finite-Length Nonneutral Plasma Column[1] M.W. ANDERSON, T.M. O'NEIL, UCSD — Using cold fluid theory, we discuss the structure of standing electron plasma waves on a magnetized, nonneutral plasma column of finite length. Such eigenmodes can be surprisingly complex, involving a superposition of many component waves with different axial and transverse wavenumbers k_z and $k_\perp$. The dispersion relation[2] for the individual components [*i.e.*, $\omega = \omega_p k_z / \sqrt{k_z^2 + k_\perp^2}$] implies that waves with small k_z and $k_\perp$ can be degenerate with waves with large k_z and $k_\perp$. Reflection at the column ends mixes these degenerate components, yielding the complicated structure. We have in mind eigenmodes on a cryogenic plasma column, where cold fluid theory is valid even for waves with large k_z and $k_\perp$. In a warmer plasma, kinetic effects (*e.g.*, Landau damping of the large wavenumber components) spoils the degeneracy and kills the mixing.

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[2]A.W. Trivelpiece and R.W. Gould, J. Appl. Phys. **30**, 1784 (1959).

Michael Anderson
UCSD

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