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Squeeze Effects on Plasma Wave Damping[1] A. ASHOURVAN, D.H.E. DUBIN, UCSD — Theory is presented for the damping of cylindrically-symmetric plasma modes in a nonneutral plasma column due to a squeeze potential applied to the center of the column. Squeeze divides the plasma into passing and trapped particles; the latter cannot pass over the squeeze. In collisionless theory, mode damping is caused by Landau resonances at energies E_n for which the bounce frequency $\omega_b(E_n)$ and the wave frequency ω satisfy $\omega = n\omega_b(E_n)$. A squeeze induces bounce harmonics in the perturbed trapped particle distribution with $n \gg 1$ because such particles see a substantially non-sinusoidal time variation in the perturbed potential as they bounce off the squeeze. This allows resonances at energies $E_n \sim T$ and therefore causes substantial damping, even when ω is large compared to the thermal bounce frequency $\omega_b(T)$. Adding collisions to the theory broadens these resonances and also creates a boundary layer at the separatrix between trapped and passing particles that further enhances the damping. Theory will be compared to experiments and simulations that observe enhanced damping due to applied squeeze.

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