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Algebraic Diocotron Mode Damping due to Radial Particle Losses[1] A.A. KABANTSEV, T.M. O'NEIL, C.F. DRISCOLL, UCSD — Algebraic damping of the $m = 1$ diocotron mode amplitude, $D(t) = D(0) - \Gamma t$, is observed in pure electron plasmas which are losing particles radially to the cylindrical wall. Experimentally, this effect is observed at high magnetic fields and low plasma temperatures, where 2D electrostatic effects presumably dominate over 3D dissipative effects. In this regime, the algebraic damping rate Γ is observed to be approximately equal to the particle loss rate, i.e. $\Gamma \sim (d/dt) \ln N$ over more than an order of magnitude in Γ. A simple 2D model of wave and plasma angular momentum exchange at the wall predicts the observed algebraic damping, and, based on the experiments, suggests that it may co-exist with exponential growth from other 2D processes such as plasma drag from collisions with neutrals. This algebraic damping will also be contrasted to the exponential growth (or damping) observed from resistive (or feed-back) wall voltages, and from near-center ejection (or injection) of electrons.

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