

Abstract Submitted
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Experimental measurements of the $m = 1$ unstable diocotron mode¹ T.B. MITCHELL, B.T. CHANG, W. SHI, Dept. of Physics and Astronomy, U. Delaware, Newark DE — The first experimental observation of an exponentially growing $m = 1$ unstable diocotron mode on a trapped, magnetized, partially hollow electron column was in 1990², and subsequent measurements examined the effect of end shape curvature³. We present new experimental measurements of the μ (initial column hollowness parameter) and κ (end shape curvature parameter) dependences of growth rates of the $m = 1$ instability. Measurements of the perturbed longitudinal temperatures of the electron column have been incorporated into the present experiments. We have experimentally established a $\mu^{4/3}$ scaling of the growth rates on the column hollowness μ for $\mu < 2.2$. Our results of growth-rate scaling on κ/μ for relatively large μ and κ are in agreement with theoretical predictions for the instability near onset $(\kappa, \mu) \rightarrow 0$ by Finn et al.⁴.

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²C. F. Driscoll, *Phys. Rev. Lett.* **64**, 645 (1990).

³A. A. Kabantsev and C. F. Driscoll, Non-Neutral Plasmas III, 208 (1999).

⁴J. M. Finn, D. del-Castillo-Negrete and D. C. Barnes, *Phys. Plasmas* **6**, 3744 (1999).

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