Abstract Submitted
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Mixing of near-degenerate plasma modes on an elliptical plasma column.[1] NICOLA PANZERI, University of Milan, ANDREY A. KABANTSEV, FRED C. DRISCOLL, DANIEL E.H. DUBIN, University of California, San Diego — An unusual Trivelpiece-Gould (TG) mode frequency splitting pattern, due to interaction with an elliptical density perturbation caused by an $m_\theta = 2$ diocotron mode, is observed for the first time in a magnetized pure electron plasma column. A single $m_\theta = 0, m_r > 1$ TG mode appears to branch out into frequency triplets as ellipticity increases. Here, m_θ and m_r are the azimuthal and radial wave numbers, respectively. For sufficiently small elliptical perturbations, the mode splitting $\Delta f / f$ is linearly proportional to the plasma density quadrupole moment q_2. An explanation of this effect involves mixing of the axisymmetric ($m_\theta = 0$) mode with two non-axisymmetric ($m_\theta \neq 0$) nearly-degenerate plasma modes. For example, both the ($m_\theta = 0$, $m_r = n$) and the ($m_\theta = 2$, $m_r = n$ -1) modes have frequencies determined by $k_z r_p \approx j_{1,n}$. We found that an elliptical density perturbation not only shifts the frequencies of the modes, but it also removes the orthogonality, with near-degeneracy allowing strong mixing of the eigenfunctions: the ($m_\theta = 2$) modes pick up the ($m_\theta = 0$) components resulting in the splitting pattern.

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