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Theory of Resonant Downscattering of Diocotron Modes[1] TRAVIS MITCHELL, BEN CHANG, NATHAN MATTOR, University of Delaware — Magnetized electron columns evolve in (r, θ) as 2D vortices in an incompressible inviscid fluid. Resonant downscattering in which modes downscatter to lower azimuthal mode number has been experimentally observed to be an important damping mechanism.[2] The phenomenon is a fluid analogue to nonlinear Landau damping. Here, we present a quantitative theory of resonant downscattering of two dimensional diocotron modes on an electron column (or Kelvin waves on a fluid vortex). The principal new result is a quantitative prediction of the scattering rate, which we compare with experimental measurements. Theory and experiment agree well, although the experimental uncertainties are somewhat large. Comparisons of the theory with new measurements featuring higher spatial resolution, currently underway, will be presented.

[1]Supported by the National Science Foundation.
[2]T. B. Mitchell and C. F. Driscoll, Phys. Rev. Lett. **73**, 2196 (1994).

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