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Resonant excitation of arbitrary Kelvin-Helmholtz modes driven by rotating electric fields in magnetized nonneutral plasmas GIANCARLO MAERO, NICOLA PANZERI, ROBERTO POZZOLI, MASSIMILIANO ROME', University of Milan — Trapped nonneutral plasmas are an excellent environment to investigate the nonlinear dynamics of collective systems like two-dimensional inviscid fluids. Starting from a single, axisymmetric column of a single-component plasma in a Penning-Malmberg trap (fluid vortex), a Kelvin-Helmholtz perturbation of any wavenumber can be induced in the vortex by a proper multipolar rotating field applied to the azimuthal patches of a sectored electrode. A linear theory demonstrates that modes with arbitrarily high wavenumber can be excited even when a limited number of sectors (typically four or eight) is available. In experiments and particle-in-cell simulations we observed the resonant wave growth to the nonlinear regime, where saturation and collapse to lower-order modes can occur. Mode frequency dependence on the wave amplitude, excitation strength and initial density profile affect width and shifting of the resonance peak. Opportunities for accurate control of the wave amplitude are also discussed.

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