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Instability of the $m = 1$ self-shielded mode in finite-length non-neutral plasmas R.L. SPENCER, G.W. MASON, M. POWELL, Brigham Young University — The $m = 1$ self-shielded mode in a Malmberg-Penning trap is stable for a hollowed density profile in the infinite-length theory, but has been observed to be unstable in experiments. Earlier work by us and others showed theory and simulations to be a persistent factor of about 2 or more lower than experiment for the growth rate when applied to a single experimental point from measurements of Kabantsev and Driscoll (UCSD). Recently Shi, Chang, and Mitchell (University of Delaware) have measured the growth rates of the mode for a series of hollowed plasmas. We have done drift-kinetic particle-in- cell simulations of several of these experimental equilibria and have found the simulated growth rates also to be lower than experiment. We describe numerical experiments to vary the shape of the plasma ends, to vary the velocity distribution as it might result from the hollowing procedure, and to introduce resistive energy losses from the sectored confining ring to explain the discrepancy.

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