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Simulating the experimental detectability of axisymmetric Bernstein modes in a finite-length non-neutral plasma GRANT HART, BRYAN PETERSON, ROSS SPENCER, MITCHELL CLINGO, Brigham Young Univ - Provo — We use a 2-D PIC code to model high-frequency axisymmetric oscillations in a finite-length pure-ion plasma. These modes are not detectable in the surface charge on the walls of infinite-length plasmas because of axisymmetry and lack of z-dependence. This is not true in a finite-length plasma, because the perturbed density has to have nodes a short distance beyond the ends of the plasma. This gives the modes a $\cos(k_z z)$ or $\sin(k_z z)$ dependence, with a k_z such that an integral number (approximately) of half-wavelengths fit into the plasma. This z-dependence makes the mode detectable in the surface charge on the walls. There are two effects that contribute to the size of the signal induced on the wall. For the bulk of the plasma the change in the total charge underneath a section of the wall is proportional to the density perturbation δn, and is due to $\nabla \cdot v$. The other contributor is the movement of the end of the plasma column due to the v_z of the mode. This is proportional to $v_z \partial n_0/\partial z$ and is therefore confined to the ends of the plasma. The relative size of these effects depends on the aspect ratio of the plasma. We will quantify what size of density perturbation is necessary to produce experimentally measurable signals.

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