Abstract Submitted
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Sources of Ion Acoustic Wave Feature Broadening in the Thomson Scattering Spectrum of Gas-Puff Z-Pinches[1] SOPHIA ROCCO, E. SANDER LAVINE, Cornell University, JACOB BANASEK, UC San Diego, WILLIAM POTTER, DAVID HAMMER, Cornell University — Ion acoustic wave (IAW) feature broadening in collective Thomson scattering in neon gas-puff z-pinch plasmas is investigated on the COBRA pulsed power generator (rise time 240 ns to 0.9 MA peak current). A 526.5 nm, 10 J, 2.3 ns Thomson scattering diagnostic laser enables probing of the plasma conditions with ¡ 1 mm spatial and ¡ 1 ns temporal resolution. Electron temperature and plasma flow velocity can be obtained routinely from IAW spectra, but the width of the IAW peaks depends on both ion temperature, T_i, and on fluid velocity distributions within the scattering volume. In some cases, electron temperature (T_e) and density (n_e) can be obtained from the high-frequency electron plasma wave spectral feature (EPW). The width of the EPW depends on T_e, but is also affected by fluctuations in n_e. By comparing the values of T_e derived from both scattering features, it may be possible to detect the presence of small-scale, local density variations in the plasma. Past experiments show that including a spatial velocity distribution when fitting the IAW improves the fit quality for a range of times before stagnation; with density fluctuations included in the analysis, the presence of non-thermal, small scale hydromotion in the scattering volume may be indicated.

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