Abstract Submitted
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Thomson Scattering on Laboratory Plasma Jets to Study Current Polarity Effects[1] JACOB BANASEK, SOPHIA ROCCO, WILLIAM POTTER, ERIC LAVINE, TOM BYVANK, BRUCE KUSSE, CHARLES SEYLER, DAVID HAMMER, Cornell University — Thomson scattering measurements have been performed on plasma jets created from a 15 μm thick radial Al foil load on COBRA, a 1.2 MA pulsed power machine with 100 ns rise time, to study current polarity effects on the jet. The ion acoustic wave (IAW) spectrum was recorded with a streak camera, while the electron plasma wave (EPW) spectrum was recorded on a gated camera. The Thomson scattering laser had a maximum energy of 10 J at 526.5 nm and a 2.2 ns full width at half maximum duration. Previous work showed that current polarity affects jet formation due to extended magnetohydrodynamic (XMHD) effects such as the Hall effect. Experiments show that jets with current flowing radially outward (reverse polarity) through the foil were taller and denser than jets with current flowing radially inward (standard polarity). The IAW feature with 0.5 J or 1 J of laser energy showed T_e to be 15 eV in both polaritys jets, while scattering with higher laser energies showed more heating in the reverse polarity jets due to the higher density. The EPW feature measures n_e outside of the jet to be around 5×10^{17} cm^{-3} while inside the jet n_e was at least 2×10^{18} cm^{-3}. Comparing these results with XMHD simulation can help to validate the simulations.

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