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2.10 Multi-Angled Multi-Pulsed Time-Resolved Thomson Scattering on Laboratory Plasma Jets

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Streaked Thomson scattering measurements have been performed on plasma jets created from a 15 μm thick radial Al, Ti, or Cu foil load on COBRA, a 1 MA pulsed power machine. The streaked system enables collecting scattered light from two separate laser pulses separated in time by between 3 and 14 ns. This time difference is created by splitting the initial 3 ns duration, 10 J, 526.5 nm laser beam into two separate pulses, each with 2.5 J. Both energy laser pulses are shown to heat the plasma jet by inverse bremsstrahlung radiation, as measured by the streaked Thomson scattering system. Analysis of the streak camera image showed that the electron temperature of the Al jet was increased from 20 eV up to 50 eV within about 2 ns for both laser pulses. The Ti and Cu jets both showed heating as well as sharp and complicated ion-acoustic features that were not apparent in the Al jet. Results will be presented from imaging two different fibers that viewed the plasma jet from two different scattering angles on the streak camera entrance slit simultaneously to compare temperature measurements and have a measure of the plasma density [Froula et al. PRL 2005].This research is supported by the NNSA Stewardship Sciences Academic Programs under DOE Cooperative Agreement DE-NA0001836.

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