Measurements of Radiative Shock Properties using Xray Thomson Scattering

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Radiative shocks are shock waves whose structure has been altered by radiation transport from the shock-heated matter. Such shocks are present in numerous astrophysical systems, including supernova remnants, supernovae, and accretion disks. Recent experiments have used the Omega laser to study radiative shock systems that are optically thin upstream and optically thick downstream. In these systems, a radiative precursor and high density cooling layer are formed in response to radiation lost in the upstream region. A thin slab of low-Z material is driven into a 1.1 atm. cylinder of high-Z gas at speeds > 100 km/s, producing strong radiative effects. X-ray Thomson scattering is employed, in the Compton scattering regime, to measure the electron temperature and ionization in both the precursor region and cooling layer. The experiment used emission from a Mn x-ray source oriented to produce scattering at angles near 80 degrees. The x-ray spectrum was detected using a crystal spectrometer and a gated, multi-strip, microchannel-plate detector. Measured results will be shown, and the inferred properties will be compared with results of simulations.

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