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Measuring Ultrafast Dynamics in a Dense Plasma I.V. CHURINA,
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Laser Science, Department of Physics, University of Texas, Austin — Transient
effects were measured in free standing metal film (200-400 nm) following direct
femtosecond laser heating at $1-10 \times 10^{14} \text{W/cm}^2$. Ultrafast electron-ion equilibration
dynamics in the dense plasma were studied with a single-shot measurement of the
time-dependent reflectivity and phase shift at the rear surface. The measurement
revealed the dynamics of heat and shock waves on the picosecond time scale with
sub-picosecond resolution. The experimental results were compared to the calcu-
lated reflectivity and phase shift derived from the output parameters (electron den-
sity and dc electron conductivity) of hydrodynamic simulations. We simulated our
experiments using different equation of states and ionization models in the HYADES
hydrodynamic code. Our experimental results allowed us to test the currently avail-
able models.

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