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Soft X-ray Shock Loading and Momentum Coupling in Meteorite and Planetary Materials[1] J.L. REMO, Harvard CFA, M.D. FURNISH, R.J. LAWRENCE, SNL — X-ray momentum coupling coefficients, C_M, for planetary materials were determined by measuring stress waveforms produced by impulsive radiation loading from the SNL Z- machine. Targets were iron and stone meteorites, solid and powdered dunite, and Si, Al, and Fe. All samples were $\sim$ 1 mm thick and, except for Si, backed by LiF single-crystal windows. The x-ray spectra included thermal radiation (blackbody 170 to 237 eV) and line emissions from the pinch material (Cu, Ni, Al, or stainless steel). Target fluences of 0.4 to 1.7 kJ/cm^2 at intensities 43 to 260 GW/cm^2 produced front surface plasma pressures of 2.6 to 12.4 GPa. Stress waves driven into the samples were attenuating due to the short ($\sim$ 5 ns) duration of the drive pulse. C_M was determined using the fact that an attenuating wave impulse is constant, and accounted for the mechanical impedance mismatch between samples and window. Related experiments in the literature are discussed. Values ranged from 0.8 to 3.1 x 10^{-5} s/m. CTH hydrocode modeling of x-ray coupling to porous and fully dense silica supported the experimental measurements and extrapolations to other materials. [1] Work supported by Sandia National Labs, operated by Sandia Corp., a wholly owned subsidiary of Lockheed Martin Corp., for the U.S. DOE's NNSA under contract DE-AC04-94AL85000.

Michael Furnish
Sandia National Laboratories

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