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Measurements of physical parameters on laser-irradiated iron and hydrogen targets relevant to earth and planetary interior conditions K. SHIGEMORI, D. ICHINOSE, K. OTANI, T. SANO, T. SAKAIYA, H. AZECHI, K. MIMA, ILE, Osaka Univ., T. IRIFUNE, M. IKOMA, Tokyo Inst. Tech. — We have been developing an experiment for the measurement of the sound velocity of high-temperature, high-density iron relevant to earth core by side-on x-ray radiography. When a foil target is irradiated by laser, shock wave propagates in the foil. After the shock front reaches the rear surface, reflected rarefaction wave moves back to the laser-irradiated surface. When the rarefaction wave (sound wave) reaches the laser-irradiated surface, the laser-irradiated surface starts to accelerate. From the measurement of the shock breakout timing and the rarefaction breakout timing with x-ray radiograph, it is possible to obtain the sound velocity. The experiments were done on the HIPER laser facility at ILE, Osaka Univ. In order to avoid the preheating, we employed three-layered target (CH - Au - Fe). The pulse shape of the irradiated laser was foot pulse (2ω, 4 ns, 2x10^{12} W/cm^2) followed by main pulse (3ω, 7.5 ns, 2x10^{13} W/cm^2). We measured the shock velocity and the shocked temperature from the rear-surface emission spectrum to characterize pressure and temperature of the laser-compressed iron in addition to the sound velocity. We also started an experiment for liquid hydrogen targets relevant to Jupiter condition. Preliminary experimental results on the shock measurements on hydrogen are presented.

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