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Measurements of sound velocity of laser-irradiated iron foils relevant to earth inner core condition K. SHIGEMORI, ILE, Osaka University, T. IRIFUNE, GRC, Ehime Univ., T. SHIOTA, K. OTANI, T. SAKAIYA, H. AZECHI, ILE, Osaka Univ. — We have demonstrated an experiment for the measurement of the sound speed of high-temperature (6000 - 8000C), high-pressure (350 GPa) iron relevant to earth inner core with intense laser. When the iron target is irradiated by laser, the shock wave passes through the iron. After the shock front reaches the rear surface, the 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 the 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, 2×10^{12} W/cm^2) followed by main pulse (3ω, 7.5 ns, 2×10^{13} W/cm^2). We measured the sound velocity of shock-compressed Fe foils with side-on x-ray backlighting technique. We also measured the shock velocity and the shocked temperature from the rear-surface emission spectrum to characterize pressure and temperature of the laser-compressed iron.

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