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Developing a novel technique for absolute measurements of the principal- and second-shock Hugoniotsa benchmark for the impedance-match methods YUNJUN GU, JUN ZHENG, QIFENG CHEN, CHENGJUN LI, JIANGTAO LI, ZHIYUN CHEN, Institute of Fluid Physics, China Academy of Engineering Physics (CAEP) — A novel diagnostics configuration was presented for performing the absolute measurements of the principal- and second-shock Hugoniots of the dense gaseous H2+D2 mixtures under multi-shock compression and probing their thermodynamic properties by a joint diagnostics of multi-channel optical pyrometer (MCOP), Doppler Pin System (DPS), and streak camera. This technique allowed the time-resolved optical radiation histories, interface velocity profiles, and time-resolved spectrum of the multi-compressed sample to be simultaneously measured in a single shot. The shock wave velocities and particle velocities under the former two shock compressions can be directly determined with the help of the above multiple detects instead of the impedance-match methods. So, absolute measurements of the principal- and second-shock Hugoniots for pre-compressed dense gaseous H2+D2 mixtures under multi-shock compression can be achieved, which provides a benchmark for the impedance-match measurement technique. Furthermore, the combination of multiple diagnostics also allows different experimental observables to be cross-checked, which reinforces the reliability of the experimental measurements.

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