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A combined technique for measuring Hugoniot and interfacial temperature of preheated metals JUN LI, XIANMING ZHOU, JIABO LI, QINGSONG WANG, NATIONAL KEY LABORATORY FOR SHOCK WAVE AND DETONATION PHYSICS, INSTITUTE OF FLUID PHYSICS COLLABORATION — A convenient method was developed to perform a combined shock-Hugoniot and interfacial temperature measurement of metals over initial temperature range of 300-1000 K. Experimental details in our investigation are described of (i) a resistive heater placed around the metal specimen to generate a controllable, stable heating source and (ii) a fiber-optic probe with an optical lens coupling system and thirteen 62.5 μm diameter silica fibers to carry out non-contact measurements for shock velocities and interfacial thermal temperatures of preheated metal. Using shock experimental results of tantalum initially heated to 773 K, a best linear fit of shock velocity to particle velocity gives the coefficients of U_S(km/s)=1.540(km/s) $+1.883U_p$ (km/s) between 248 and 307 GPa, and is obviously 3%-5% below Hugoniot measurements from a room temperature initial state. And obtained interfacial temperatures are in agreement with theoretical calculations of pressure-temperature (P-T) curve. It is indicated that our method is practicable for measuring Hugoniot and shock temperature of preheated metal, which could provide an important approach for studying the temperature effect of shocked metals.

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