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Measurement of thermal conductivity of sapphire at shock compression XIANMING ZHOU, JUN LI, JIABO LI, National Key Laboratory for Shock Wave and Detonation Physics, Institute of Fluid Physics, People's Republic of China — Measurement of thermal conductivity in materials at dynamic high pressure and temperature condition is a key step to the development of shock temperature measurement technique for opaque materials. Here, we present a recent progress in developing technique to measure thermal conductvity of a shocked window material. Our feature improvement over the previous method in the literature is that not only the thermal relaxation but also the optical extinction process was dectected in one shock compression experiment. Besides, the gap-flash effect has been controlled to an accepted extent by a separately vacuumed sample box and a numeric simulation method of the non-linear heat flow was introduced into the data analysis process. All these efforts provide additional information to correct the window extinction effect which was not taken into account in the original method. Primary result of heat conductivity k_w $\sim$3.54 W.m^{-1} of sapphire at $\sim$115 GPa shock pressure was obtained, which is much lower than both theoretical prediction and the previous measurement in the literature at similar shock pressure and temperature.

Xianming Zhou
National Key Laboratory for Shock Wave and Detonation Physics,
Institute of Fluid Physics, People's Republic of China

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