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Evolution of shock compression waves in a SiC ceramic ANDREY S. SAVINYKH, Institute of Problems of Chemical Physics of RAS, Chernogolovka, Russia, GENNADY I. KANEL, Joint Institute for High Temperatures of RAS, Moscow, Russia, SERGEY V. RAZORENOV, Institute of Problems of Chemical Physics of RAS, Chernogolovka, Russia, VLADIMIR I. RUMYANTSEV, LLC VIRIAL, Saint-Petersburg, Russia — The objective of this study was to estimate possible contribution of stress relaxation into the response of hard ceramic materials to high-rate compression and tension. With this goal, the free surface velocity histories have been measured for plane SiC ceramic samples of 3.07 g/cm^3 density subjected to impact by a flyer plate. The sample thickness was varied from 0.5 mm up to 8.3 mm. The peak shock stress was in a range of 17.9 - 21.9 GPa. The Hugoniot elastic limit (HEL) is in a range of 8.34 to 8.72 GPa for this material, the spall strength value is 0.5 to 0.62 GPa. Both the HEL and the spall strength are in reasonable agreement with literature data for SiC ceramics of corresponding density. Measurements have not revealed any decay of the elastic precursor wave. Moreover, it has been found the evolution of the compression wave is practically self-similar and is well described by the simple wave approach. It follows from these observations the stress relaxation does not provide significant contribution into the response of hard ceramic materials to shock-wave loading. The ramped transition from elastic to plastic wave is caused by strain hardening of the material and by successive involving of grains of various orientations into the inelastic deformation process.

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