Study of the behavior of palladium in compression and rarefaction waves under picosecond laser irradiation

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In this work, shock-wave processes are studied in a planar palladium target (about 90 μm thick) irradiated with a 70-ps (full width at half maximum) laser pulse. In the experiment on the Kamerton-T facility, the parameters of the laser pulse, as well as the depth of the spall cavity, which is formed as a result of a complex flow of compression and expansion waves through the substance on the rear side of the target, are determined. The dynamics of the resulting compression and rarefaction waves is modeled using a new equation of state for palladium at high energy densities. This equation of state is constructed in the form of an analytical function of pressure versus specific volume and specific internal energy. Based on the results of the experiment and numerical simulation, the strength of palladium at high tensile stress is estimated.