Experimental study of the structure of shock waves in a compressed powder of nikel nanoparticles

Ziborov V S[@], Dolgoborodov A Iu and Rostilov T A

Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia

[@] ziborov.vs@yandex.ru

The features of propagation of shock compression waves in samples of compressed nano-nickel particles have been studied for the first time by laser interferometry under uniaxial loading conditions. The pressure of shock compression is 1.5 and 4.1 GPa. The velocity profiles of the free surface of samples from compressed nano nickel powder were measured by laser interferometry when a one-dimensional shock compression wave was released onto it Two points on the Hugonio adiabate are obtained. The elastic limit of Hugonio PUG is 0.49 GPa. It is found that the velocity profiles of the surface when the shock wave enters it have a complex multi-stage structure in which the precursor wave is clearly distinguished. It is shown that the compression wave profile can be described by multiple reflection of the precursor wave from the free surface of the sample and the plastic compression wave following it. It is established that in the range of the studied pressures, the thickness of the sample and the loading mode determine the process of shock compression. It is shown that the difference between the states of matter behind the front of the plastic shock wave before the first reflection of the precursor and after the last reflection is significant.