# MODELING BEHAVIOR OF MIXED MATERIALS UNDER SHOCK WAVE LOADING*

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The results of numerical experiments on modeling high-energy loading on heterogeneous materials are presented. Description of thermodynamic parameters of mixed compositions under extreme conditions is one of the important tasks of mechanics, which is waiting for its solution. Theoretical and experimental research in this area has been conducted for many years [1, 2]. For the first time, method has been developed for calculating behavior of heterogeneous materials under shock wave loading that takes into account three factors: the equation of state of components, the interaction of components of mixture, and possibility of phase transition of one or more components of investigated material [3]. Due to this, thermodynamic parameters of the samples are researched in a wide range of pressure and porosity values using a thermodynamically equilibrium model. The low-parametric equation of state is using in the model [4]. The parameters of state equalization have been determined for several dozen pure materials that may be used as components of mixtures and alloys.

The model makes it possible to reliably describe the thermodynamic parameters of heterogeneous materials in the entire field of available experimental data. The values of pressure, compression ratio and temperature can be calculated depending on the composition and ratio of components under shock wave loading. The compression ratio is calculated for heterogeneous material as a whole and for each component. It is shown for mixture of W, Al and Cu the change in compression ratio for component may differ for different components not only in value, but also in sign by increasing pressure. The calculation method makes it possible to reliably describe experimental data in the field of phase transition under shock wave loading of various materials (graphite, quartz, nitrides and oxides). Thermodynamic parameters of mixtures are simulated taking into account the phase transition of one or more components for the first time. Reliable modeling of a mixture of Al and $SiO_2$ is performed. The region of the high-pressure phase transition MgO is determined.

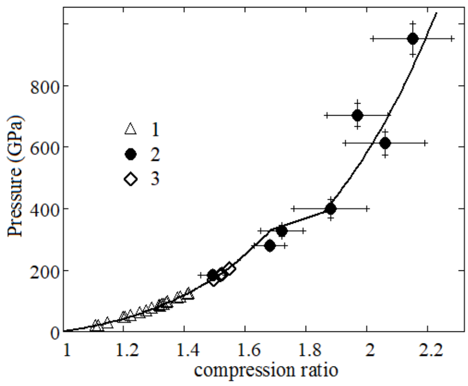


Fig.1. MgO Hugoniots. Pressure versus compression. Date 1 [5], 2 [6], 3 [7].

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