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The relaxation of shear stress in a metal alloys with a wide grain size distribution under shock loadings EVGENIYA G. SKRIPNYAK, VLADIMIR V. SKRIPNYAK, National Research Tomsk State University, NATALIYA V. SKRIPNYAK¹, National Research Tomsk State University — The influence of a grain size distribution on the relaxation of shear stress in the metal alloys under shock wave loading was investigated by numerical simulation. The model takes into account the influence of a grain size distribution and a precipitation concentration on the kinetics of shear stress relaxation. The relaxation rate of shear stress in shock waves depends on the specific volume of nano- and ultra-fine grains in the FCC and HCP metal alloys. A wide distribution of grain size reduces the relaxation rate of elastic precursor in HCP alloys. The relaxation of the elastic precursor depends on size and volume concentration of precipitates in metal alloys. Results of simulation show that the rate of plastic deformation in the shock wave exceeds significantly that of the elastic precursor at the same value of shear stresses.

¹Linkoping University, Sweden

Evgeniya G. Skripnyak
National Research Tomsk State University

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