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Mechanical Behavior of Ultrafine-grained Titanium Alloys at High Strain Rates VLADIMIR SKRIPNYAK, EVGENIA SKRIPNYAK, Tomsk State University — Features of mechanical behavior of ultrafine-grained (UFG) titanium alloys under quasistatic and shock waves loadings with amplitudes less 10 GPa are discussed in this report. Mechanical behavior of VT1-0, Ti-6Al-4V, and Ti-6-22-22S alloys was studied by numerical simulation method. Results of simulation of high velocity impacts of plates of alloys with an average grain size 300 nm have a good accordance with experimental time-history profiles of free surface velocity. The multilevel model of mechanical behavior of structured materials was used for simulation. Model takes into account a several structural factors influencing on the mechanical behavior of materials (type of a crystal lattice, density of dislocations, a size of dislocation substructures, concentration and thickness of twins, and distribution of grains sizes). Results display the strain rate sensitivity of the yield stress of UFG and polycrystalline titanium alloys is various in a range from 10^3 up to 10^6 s^{-1}. Nevertheless the difference of the Hugoniot elastic limits of UFG and coarse grained titanium alloys is not considerable.

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