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Spall fracture and strength of uranium, plutonium and their alloys under shock wave loading VLADIMIR GOLUBEV, Ludwig-Maximilian University of Munich — Numerous results on studying the spall fracture phenomenon of uranium, two its alloys with molybdenum and zirconium, plutonium and its alloy with gallium under shock wave loading are presented in the paper. The majority of tests were conducted with the samples in the form of disks 4mm in thickness. They were loaded by the impact of aluminum plates 4mm thick through a copper screen serving as the cover or bottom part of a special container. The initial temperature of samples was changed in the range of -196 – 800 C degree for uranium and $40 - 315$ C degree for plutonium. The character of spall failure of materials and the degree of damage for all tested samples were observed on the longitudinal metallographic sections of recovered samples. For a concrete test temperature, the impact velocity was sequentially changed and therefore the loading conditions corresponding to the consecutive transition from microdamage nucleation up to complete macroscopic spall fracture were determined. Numerical calculations of the conditions of shock wave loading and spall fracture of samples were performed in the elastoplastic approach. Several two- and three-dimensional effects of loading were taken into account. Some results obtained under conditions of intensive impulse irradiation and intensive explosive loading are presented too. The rather complete analysis and comparison of obtained results with the data of other researchers on the spall fracture of examined materials were conducted.

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