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Strength and structure aspects of fracture of some metals and alloys at shock wave loading VLADIMIR GOLUBEV, Russian Federal Nuclear Center - VNIIEF — Results on research in spall fracture of iron and its nine alloys (steels), aluminum, titanium, tantalum, magnesium and their several alloys, copper, nickel and lead are presented. The samples up to 20 mm thick were loaded by the aluminum projectiles up to 4 mm thick. An initial state of some materials varied due to the use of various conditions of preliminary heat treatment. Loading time varied by proportional change of thicknesses of projectiles and samples. Cooling of samples up to a temperature of -196°C and heating up to temperatures over the range of 800°C were carried out. The ranges of projectile velocities corresponding to a total spectrum of material failure, from nucleation of microdamages to complete macroscopic spall fracture of samples were determined. Loading conditions were determined with the use of a method of numerical elastic-plastic calculation. The structural analysis of a state of materials before and after shock wave loading was carried out with the use of methods of metallographic, electronic-microscopic and X-ray analyses, and also by measurement of microhardness. The basic attention was given to metallography and fractography of the nature of spall fracture. Comparison of the obtained results on the spall strength and nature of spall fracture with the data of other authors was carried out.

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