Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Fracture response of several metals to fast heating of samples by intensive X-ray radiation VLADIMIR GOLUBEV, Ludwig-Maximilian University of Munich — Results on studying the fracture response of metals samples in the form of thin disks to fast heating by the intensive pulse of X-ray radiation of a complete spectrum are presented in the paper. The samples of such metals as iron, copper, AMg6 aluminum, VT14 titanium, molybdenum, tungsten, cadmium, lead and zinc were tested. The samples were fixed in the special cartridges that were placed at such distances from the X-ray irradiator where the energy fluxes were 1.38, 0.90 and 0.29 kJ/cm^2. The irradiating X-ray pulse was about 2 ns in duration. After testing, the depth of material ablation from a sample front surface and the degree and character of its spall damage were determined. The method of metallographic analysis was used for these purposes. The spectrum data were used for the calculations of samples heating. Numerical calculations of thermomechanical and shock wave loading conditions were made with the use of the equation of state taking into account the process of evaporation. The calculated value of maximum negative pressure in the sample at the coordinate corresponding to the depth of ablation and formation of spallation zones or spall cracks was conventionally accepted as the material resistance to spall fracture in such conditions. The comparison of obtained results with the data on the fracture of examined materials in the conditions of fast heating by the X-ray pulse with a hard spectrum and by the high-current electron beam of an electron pulse generator was conducted.

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Date submitted: 01 Feb 2015 Electronic form version 1.4