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Fracture of nanoceramics with porous structure at shock wave loadings EVGENIYA SKRIPNYAK, VLADIMIR SKRIPNYAK, VLADIMIR SKRIPNYAK, Tomsk State University — Features of deformation and damaging of porous nanoceramics and nanocomposites under shock wave loadings with amplitudes up to 10 GPa on were investigated on the meso-scale levels by a computer simulation method. The two-level model was applied to the description of the mechanical response of representative volume of structured ceramics. The fracture of oxide, boride and carbide ceramics under pulse loading is associated with the nucleation and growth of cracks on the mesolevels. Process of a fragmentation is governed by laws of shift and rotation of the formed blocks parted by cracks. Laws of formation and movement of block substructures in models of oxide and boride ceramics and ceramic nanocomposites depends on sizes, shapes of voids, and their volume distribution. The sizes of blocks surpass the average sizes of grains and have distribution. The formation of blocks and their movement under dynamic loads occurs in essentially non-stationary and non-uniform field of stress. As a result, laws of ceramics fragmentation depend on amplitudes and durations of stress pulses. Presence of voids of the micron size or clusters of nano-voids in the considered classes of ceramics causes the decrease of the Hugoniot elastic limit, and the spall strength.

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