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Mechanical Behavior of Ceramic Composites under Pulse Loadings[1] EVGENIYA SKRIPNYAK, VLADIMIR A. SKRIPNYAK, VLADIMIR V. SKRIPNYAK, National Research Tomsk State University, TOMSK STATE UNIVERSITY TEAM — The prediction of mechanical behavior ceramic composites under pulse loadings is the complicated problem owing to insufficient knowledge about laws of structure evolution and nucleation and accumulation of damages. Computer simulation of mechanical behavior of ceramic composites at single and repeated pulse influences of submicrosecond duration are presented in the given work. The model of the structured representative volume of ultrafine-grained ceramics composites was developed using the data of microscopic researches. Deformation and damage of structured representative volumes of some ceramic composites on meso-scale level were simulated under pulse loadings having amplitudes near several GPa. The critical fracture stress on meso-scale level depends not only on relative volumes of voids and strengthened phases, but also sizes of corresponding structure elements. It was shown that the isolated micro- and meso-scale cracks can be generated in ceramic composites at pulse amplitude less than the Hugoniot elastic limit. In the studied ceramic composites the critical failure stress in spall zone is changed nonmonotonically with growth of the volume concentration of strengthened phases.

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