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Numerical simulation of spall failure in metals under shock compression[1] YURIY BAYANDIN, OLEG NAIMARK, SERGEY UVAROV — Nonlinear aspects of damage localization and damage-failure transition are the subject of long-term research and arise both fundamental and applied interest related to multiscale nature of failure mechanism. The developed statistical model of solid with mesoscopic defects allowed the formulation of phenomenological model in terms of two independent variables - the defect density tensor and structural scaling parameter and the simulation of shock wave propagation in the linkage with structural relaxation phenomena. Presented investigation is related to the study of damage-failure scenario in the plate impact test (spall failure) taking into account long-range correlation properties induced by the collective modes of defects. Numerical simulation of plane shock wave propagation was carried out to establish spall conditions and to propose the mechanism of damage-failure transitions as a specific form of self-organized criticality in the ensemble of mesoscopic defects - structural-scaling transition. Characteristic features of this transition are the generation of collective modes in mesodefect ensemble that are responsible for damage localization and transition to failure.

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Yuriy Bayandin
Institute of Continuous Media Mechanics, UB of RAS

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