

Abstract Submitted  
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**Damage-Failure Transition: Dynamic Crack Branching, Fragmentation, Failure Wave** OLEG NAIMARK, OLEG PLEKHOV, Institute of Continuous Media Mechanics of RAS, WILLIAM PROUD, Cavendish Laboratory, Cambridge University, SERGEY UVAROV, Institute of Continuous Media Mechanics of RAS — Damage-failure transition as specific type criticality is studied both theoretically and experimentally to link behavior of nonlinear system “solid with mesodefects” with generation of collective modes of mesodefects (microcracks, microshears) and subjection of crack dynamics, fragmentation statistics and failure wave generation to evolution of these modes. It is shown that scenario of crack dynamics (transition from steady state to branching regime), different types of fragmentation statistics depending on imposed energy density, failure wave generation are the consequence of symmetry dropping related to blow-up collective modes of damage localization kinetics. High resolution experiments for recording of crack dynamics in preloaded PMMA plate, shock wave and damage dynamics in fused quartz for Taylor tests, correlation analysis of stress phase portraits supported theoretical results concerning the nature of qualitative changes of fragmentation statistics and failure wave generation related to resonance excitation of mentioned collective modes.

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