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Propagation of Cracks in Terms of Continuum Damage Mechanics

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The paper deals with crack nucleation and propagation caused by time-dependent process of deterioration in creep conditions. Three distinctive stages of the damage growth in a rectangular plate subjected to uniform pressure load are considered: nucleation in a point, propagation through the plate thickness, and development of critical network of the cracks bringing a structure to the final collapse. With corresponding times denoted by t1, t2, and t3, their relationships had been evaluated to indicate the safety margins throughout the whole process. Spatial configuration of crack networks, including their profiles and branching, is shown as time-dependent process, which leads to the structure collapse caused by the loss of kinematical stability.

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