

SCALE INTERACTION AND ORDERING EFFECTS AT FRACTURE

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Many technical and natural systems are characterized by presence of inherent or loading induced series of length scales. The fracture processes in such systems has many features. In particular, ordered systems of faults or cracks can be formed. Different scenarios of fracture process ordering will be analyzed (in particular, the possibilities of ordered multiscale crack systems formation accompanied by increasing or decreasing the scales of the sequentially formed cracks sub-systems will be illustrated). The problem of providing safety and reliability of the hierarchical technical systems will also be discussed accounting for the possibilities of energy redistribution between the scales of the system at fracture and probabilistic aspects of fracture processes in such systems. Examples of prevention of catastrophic failure in a hierarchical system will be given. The paper will be based on the studies performed by the author and his team as well as on the available publications of other specialists.

Keywords: scale; interaction; fracture; ordering; hierarchical systems;