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Dynamic fracture mechanics. (Russian. English summary) Zbl 0566.73080
Itogi Nauki Tekh., Ser. Mekh. Deform. Tverd. Tela 16, 3-78 (1983).

The number of publications in the dynamic fracture mechanics increased sharply in the last decade. The present review deals with the fundamentals of dynamic fracture mechanics, the classification of problems and methods of their solution. Asymptotic expressions for displacements and stresses near propagating crack tips, main energy relations and conditions of destruction are given. Along with basic problems on semi-infinite and finite cracks in plane and space under harmonic or impact loading, a number of more complicated and realistic problems are analyzed and, particularly, the problems for cracks disposed near the half-plane boundary or on the line of discontinuity of elastic characteristics, for cracks propagating in both sides with variable arbitrary velocities. Special attention is paid to numerical methods in dynamic fracture mechanics. Various aspects of applications of the finite difference method, singular finite elements, J-integral, and the weight function method are discussed. Possibilities of application of numerical methods for treatment of experiments are accented.

MSC:

- 74R05 Brittle damage
- 74S99 Numerical and other methods in solid mechanics
- 74S05 Finite element methods applied to problems in solid mechanics

Keywords:

bibliography; dynamic fracture mechanics; review; Asymptotic expressions; displacements; stresses; crack tips; main energy relations; conditions of destruction; semi-infinite; finite cracks; plane; space; harmonic or impact loading; cracks disposed near the half-plane boundary; line of discontinuity of elastic characteristics; variable arbitrary velocities; numerical methods; finite difference method; singular finite elements; J- integral; weight function method