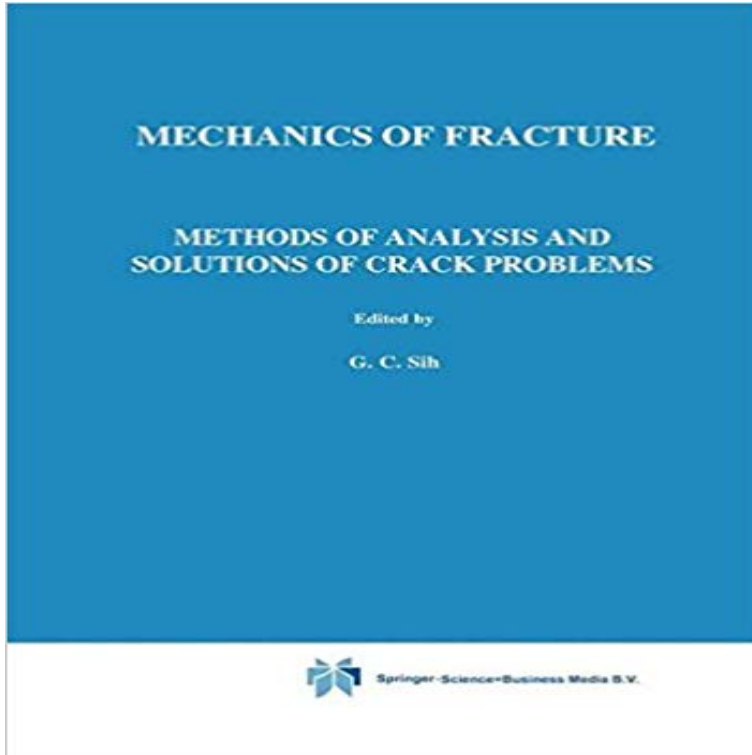


# Mechanics of Fracture: Methods of Analysis and Solutions of Crack Problems VOL 1



It is well known that the traditional failure criteria cannot adequately explain failures which occur at a nominal stress level considerably lower than the ultimate strength of the material. The current procedure for predicting the safe loads or safe useful life of a structural member has been evolved around the discipline of linear fracture mechanics. This approach introduces the concept of a crack extension force which can be used to rank materials in some order of fracture resistance. The idea is to determine the largest crack that a material will tolerate without failure. Laboratory methods for characterizing the fracture toughness of many engineering materials are now available. While these test data are useful for providing some rough guidance in the choice of materials, it is not clear how they could be used in the design of a structure. The understanding of the relationship between laboratory tests and fracture design of structures is, to say the least, deficient. Fracture mechanics is presently at a standstill until the basic problems of scaling from laboratory models to full size structures and mixed mode crack propagation are resolved. The answers to these questions require some basic understanding of the theory and will not be found by testing more specimens. The current theory of fracture is inadequate for many reasons. First of all it can only treat idealized problems where the applied load must be directed normal to the crack plane.

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