

## عنوان مقاله:

Fatigue Crack Growth in Plastically Compressible Solids: Role of Negative Stress Ratio, Plastic Compressibility and Strain Softening

## محل انتشار:

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## خلاصه مقاله:

The effect of cyclic loading on fatigue crack growth in plastically compressible solids is investigated at negative stress ratio under plane strain and small scale yielding conditions. The material is characterized by a finite strain elastic viscoplastic constitutive model with hardening and hardening-softening-hardening hardness functions. Displacements corresponding to the isotropic linear elastic mode I crack field are prescribed on a remote boundary. The plastic crack growth, crack tip opening displacement (CTOD) and near crack tip stress fields are presented using finite element method. Material hardening/ softening has a major relevance on crack growth, CTOD and the evolution of stress distribution. It is revealed here that the negative stress ratio can significantly influence the loading conditions at the crack tip and thereby increase the crack growth for tension-compression loading for hardening material whereas the fatigue crack growth of plastically compressible hardening-softening-hardening material is only slightly affected by the negative stress ratio albeit it is accepted in literature that compressive loads contribute to fatigue crack growth significantly. In the present studies, the CTOD variation with applied load and the near stress distribution are also very unusual in nature.

## کلمات کلیدی:

Compressible solids, Fatigue Crack Growth, Finite Element Method, Material softening, Negative stress ratio

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