

Stress and Strain Analysis of Notched Bodies Subject to Non-Proportional Loadings

Authors : Ayhan Ince

Abstract : In this paper, an analytical simplified method for calculating elasto-plastic stresses strains of notched bodies subject to non-proportional loading paths is discussed. The method was based on the Neuber notch correction, which relates the incremental elastic and elastic-plastic strain energy densities at the notch root and the material constitutive relationship. The validity of the method was presented by comparing computed results of the proposed model against finite element numerical data of notched shaft. The comparison showed that the model estimated notch-root elasto-plastic stresses strains with good accuracy using linear-elastic stresses. The proposed model provides more efficient and simple analysis method preferable to expensive experimental component tests and more complex and time consuming incremental non-linear FE analysis. The model is particularly suitable to perform fatigue life and fatigue damage estimates of notched components subjected to non-proportional loading paths.

Keywords : elasto-plastic, stress-strain, notch analysis, nonproportional loadings, cyclic plasticity, fatigue

Conference Title : ICSM 2015 : International Conference on Solid Mechanics

Conference Location : Toronto, Canada

Conference Dates : June 15-16, 2015