

Notched Fatigue Behavior under Multiaxial Stress States

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Abstract :

Most engineering components and structures contain stress concentrations, such as notches. The state of stress at such concentrations is typically multiaxial due to the notch geometry, and/or multiaxiality of the loading. Significant portions of the fatigue life of notched members is usually spent in crack initiation (crack formation and microscopic growth), as well as crack growth (macroscopic growth). Available experimental evidence suggests the current life estimation and fatigue damage analysis techniques commonly used are not capable of accurate predictions for such complex and yet highly practical conditions. This presentation discusses notched fatigue behavior of metallic materials under a variety of multiaxial loadings. Explanations are provided for the discrepancy typically observed between fatigue damage development in smooth specimens (i.e. shear or mode II) and in notched specimens (typically tensile or mode I). Reasonably accurate life prediction techniques are also presented for notched components and structures.