

Crack initiation life prediction for solid cylinders with transverse circular holes under in-phase and out-of-phase multiaxial loading

任貽明, 王維偉

Mechanical Engineering

Engineering

ymjen@chu.edu.tw

Abstract

This work investigates crack initiation life for AISI 316 stainless steel solid cylinders with transverse circular holes under in-phase and out-of-phase multiaxial loading. Elastic-plastic finite element analysis is applied to determine the local stress/strain state. Four critical plane approaches and four combined energy and critical plane approaches are employed to predict the crack initiation life by correlating the predictive parameters with smooth specimen data. The critical plane model proposed by Fatemi and Socie and the energy-critical plane prediction model for shear failure-type material proposed by Chen, Xu and Han in 1999 are found to yield better predictions than other models. The location of crack initiation is also investigated herein and compared with the experimentally obtained results.

Keyword : Out-of-phase, Crack initiation life, Notch, Critical plane approach, Finite element method.