

Prediction of Low-Cycle Contact Fatigue Life of Sleeve-Pin-Shaft
Connections under Axial and Torsional Cyclic Loading

任貽明, 葉銘泉, 魏正龍, 許國慶

Mechanical Engineering

Engineering

ymjen@chu.edu.tw

Abstract

This study experimentally analyzes the contact fatigue life of the sleeve - pin - shaft connection specimens under cyclic axial and pure torsional loading. Based on the stress/strain results along the pin - hole edge of the shaft obtained using the finite element method, four stress-based and three strain-based critical plane parameters were considered to predict the locations of crack initiation and crack initiation life. This work describes in detail the contact finite element analysis and the interfacial stress/strain behavior of the connections under push - pull and torsional loading can be obtained. In the present paper, a comparison of predicted results with experimental data indicates that the Fatemi - Socie parameter expressed as the combination of the shear strain amplitude and the normal stress on the critical plane estimates crack initiation life and damage locations more accurately than other theories. The application of fretting wear parameters in the evaluation of crack initiation life of the studied connection specimens is also discussed.

Keyword : Contact fatigue, Crack initiation life, Critical plane approach, Biaxial loading, Fretting.