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Abstract

Crack growth in a T-shaped tubular joint is studied using a newly developed system to simulate three-dimensional crack propagation and fatigue testing results. Tetrahedral finite element (FE) modeling is adopted to analyze a tubular structure with a curved surface crack. The virtual crack closure-integral method is used to evaluate the fracture mechanics parameters. The FE crack modeling with a remeshing procedure using an automated mesh generation system greatly simplifies the crack propagation simulation. The calculation results are compared with the experiments.

Keywords: Tubular joint, Fracture mechanics, Crack propagation simulation, Finite elements, Fatigue testing

1. Introduction

Steel pipes and tubular joints are commonly employed as onshore and offshore structural members in applications such as bridges, airports, rigs, and