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Effect of Geometric Parameters on the Stress Intensity Factors (SIFs) in Tubular X-joints of Jacket-type Platforms

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Abstract

Methods of estimating the remaining life of cracked tubular joints in offshore jacket-type platforms are based on fracture mechanics (FM) approach. The accuracy of FM approach depends on the accurate estimation of the stress intensity factors (SIFs). In the present paper, effects of geometric parameters on the results of SIFs for tubular X-joints are investigated. In this study, FE models were generated using ABAQUS and to evaluate the SIFs, J-integral method was used. Numerical SIF results were validated against available experimental data. Results showed that the J-integral method is suitable for the calculation of SIFs. The increase of the γ (= D / 2T) and/or β (= d / D) leads to the decrease of the SIFs. Moreover, the increase of the τ (= t / T), c / a ratio and/or a / T ratio results in the increase of the SIFs; where D, d, T, t, a, and c are the chord diameter, brace diameter, chord thickness, brace thickness, crack depth, and half of crack length, respectively.

Keywords: *Tubular X-joints, Fatigue, Fracture mechanic, Surface crack, Stress intensity factor (SIF), J-Integral method.*