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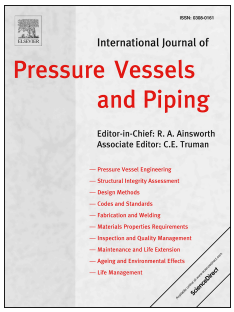

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Elastic *T*-stress and I-II mixed mode stress intensity factors for a through-wall crack in an inner-pressured pipe

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Abstract

Elastic *T*-stress and stress intensity factor (SIF) solutions for through-wall-cracked pipes under internal pressures have been investigated by three-dimensional (3D) finite element (FE) calculations. The distribution of normalized SIFs (mode I K_I and mode II K_{II}) and *T*-stresses along the crack front for different crack lengths, crack orientations, thickness ratios and Poisson's ratios has been obtained in detail. Our FE results show that the *T*-stresses increase with increasing Poisson's ratio and crack angle, respectively. The normalized K_I increases while K_{II} decreases with increasing Poisson's ratio, respectively. The normalized K_I decreases with increasing crack angle, while K_{II} increases with increasing crack angle from 0º to 45º and then decreases from 45º to 90º. Finally, the empirical formulae of the three-parameter K_I, K_{II} and *T*-stress have been derived by fitting present FE results with the least-squares method for the convenience of engineering applications.

Keywords: *T*-stress, Stress intensity factor, Through-wall-cracked pipes

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