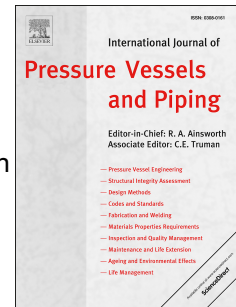


Accepted Manuscript

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PII: S0308-0161(16)30401-X

DOI: [10.1016/j.ijpvp.2017.11.010](https://doi.org/10.1016/j.ijpvp.2017.11.010)

Reference: IPVP 3666

To appear in: *International Journal of Pressure Vessels and Piping*

Received Date: 24 November 2016

Revised Date: 14 October 2017

Accepted Date: 15 November 2017

Please cite this article as: Yu P, Wang Q, Zhang C, Zhao J, Elastic T -stress and I-II mixed mode stress intensity factors for a through-wall crack in an inner-pressured pipe, *International Journal of Pressure Vessels and Piping* (2017), doi: 10.1016/j.ijpvp.2017.11.010.

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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 0° to 45° and then decreases from 45° to 90° . 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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