

The Interaction of Adjacent Defects and the Effect on the Failure Pressure of the Corroded Pipeline

Authors : W. Wang, Y. Zhang, J. Shuai, Z. Lv

Abstract : The interaction between defects has an essential influence on the bearing capacity of pipelines. This work developed the finite element model of pipelines containing adjacent defects, which includes longitudinally aligned, circumferentially aligned, and diagonally aligned defects. The relationships between spacing and geometries of defects and the failure pressure of pipelines, and the interaction between defects are investigated. The results show that the orientation of defects is an influential factor in the failure pressure of the pipeline. The influence of defect spacing on the failure pressure of the pipeline is non-linear, and the relationship presents different trends depending on the orientation of defects. The increase of defect geometry will weaken the failure pressure of the pipeline, and for the interaction between defects, the increase of defect depth will enhance it, and the increase of defect length will weaken it. According to the research on the interaction rule between defects with different orientations, the interacting coefficients under different orientations of defects are compared. It is determined that the diagonally aligned defects with the overlap of longitudinal projections are the most obvious arrangement of interaction between defects, and the limited distance of interaction between defects is proposed.

Keywords : pipeline, adjacent defects, interaction between defects, failure pressure

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