World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:18, No:03, 2024

Enhancing Rupture Pressure Prediction for Corroded Pipes Through Finite Element Optimization

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Abstract : Algeria is actively enhancing gas productivity by augmenting the supply flow. However, this effort has led to increased internal pressure, posing a potential risk to the pipeline's integrity, particularly in the presence of corrosion defects. Sonatrach relies on a vast network of pipelines spanning 24,000 kilometers for the transportation of gas and oil. The aging of these pipelines raises the likelihood of corrosion both internally and externally, heightening the risk of ruptures. To address this issue, a comprehensive inspection is imperative, utilizing specialized scraping tools. These advanced tools furnish a detailed assessment of all pipeline defects. It is essential to recalculate the pressure parameters to safeguard the corroded pipeline's integrity while ensuring the continuity of production. In this context, Sonatrach employs symbolic pressure limit calculations, such as ASME B31G (2009) and the modified ASME B31G (2012). The aim of this study is to perform a comparative analysis of various limit pressure calculation methods documented in the literature, namely DNV RP F-101, SHELL, P-CORRC, NETTO, and CSA Z662. This comparative assessment will be based on a dataset comprising 329 burst tests published in the literature. Ultimately, we intend to introduce a novel approach grounded in the finite element method, employing ANSYS software.

Keywords : pipeline burst pressure, burst test, corrosion defect, corroded pipeline, finite element method
Conference Title : ICFF 2024 : International Conference on Fatigue and Fracture
Conference Location : Paris, France
Conference Dates : March 25-26, 2024