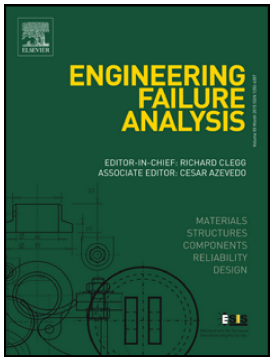

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Probabilistic analysis of corroded pipelines based on a new failure pressure model

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ABSTRACT

The paper provides a new model to predict the burst pressure for corroded pipeline by finite element method. Error analysis with commonly used models shows that the new model has better prediction precision. Based on this model, the limit state equation is established and numerically solved by using Monte Carlo Simulation (MCS). It shows that the new model is feasible for reliability analysis of corroded pipelines when compared with other widely used models. The sensitivity analysis of parameters and model revealed that the corrosion depth and the pipeline operation pressure have the most influence on the pipeline failure probability.

Key words: Reliability; Modelling studies; Corrosion;Failure;

NOMENCLATURE

σ	true stress in simple tension
E	elastic modulus
ε	true strain in simple tension
ν	poisson's ratio
ε_0	initial strain, where $\varepsilon_0 = \frac{\sigma_y}{E}$
σ_y	yield strength
K	the strength coefficient
α	the strain hardening coefficient
n	the strain hardening exponent
UTS	ultimate tensile strength, MPa
D	outer diameters of the pipeline, mm
t	wall thicknesses of the pipeline, mm
p_f	failure pressure, MPa
d	corrosion depth, mm
L	corrosion length, mm
w	width of the corrosion defect, mm