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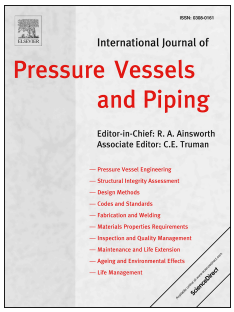

Pressure carrying capacities of thin walled pipes suffering from random colonies of pitting corrosion

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Pressure Carrying Capacities of Thin Walled Pipes Suffering from Random Colonies of Pitting Corrosion

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Abstract

This paper investigates the influence of widely-spread randomly-distributed pits on the pressure carrying capacity of pipes using nonlinear finite element models for pitting colonies of Grades 1, 2 and 3 of Part-6 of API 579-1/ASME FFS-1 (FFS). Burst pressure predictions for pipes suffering from pitting with increasing severity are obtained and compared with those determined from lower levels of assessment provided in FFS. Upon re-evaluation of standard tabulated values for remaining strength factor (RSF) by means of limit load analysis using FEA for colonies with uniform pit depths, results of Level-1 assessment became more aligned with overall merit of FFS conservatism. For Level-2 assessment, the current investigation showed the need to modulate the conservatism of local thinned areas (LTA) approach. Despite the validity of adopting the LTA check within Level-2 assessment of pitting colonies, the final outcome of the combined RSF is highly conservative compared to RSF estimated by FEA.

Key words: pitting corrosion, burst pressure, fitness-for-service (FFS), limit pressure, failure pressure, nonlinear finite element, shell elements, thin-walled pipes

Declarations of interest: none

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