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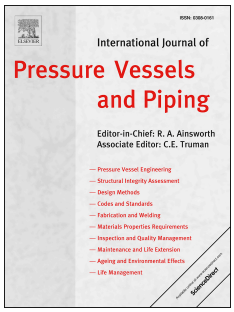

Prediction of residual stresses in girth welded pipes using an artificial neural network approach

J. Mathew, R.J. Moat, S. Paddea, M.E. Fitzpatrick, P.J. Bouchard

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Prediction of residual stresses in girth welded pipes using an artificial neural network approach

J. Mathew [a,b*], R. J. Moat [b], S. Paddea [b], M.E. Fitzpatrick [c], P.J. Bouchard [b]

[a] *Now at: Faculty of Engineering and Computing, Coventry University, Priory Street, Coventry CV1 5FB, UK*

[b] *Department of Engineering and Innovation, The Open University, Walton hall, Milton Keynes, MK7 6AA, UK*

[c] *Faculty of Engineering and Computing, Coventry University, Priory Street, Coventry CV1 5FB, UK*

**Corresponding author email address: Jino.Mathew@coventry.ac.uk*

Abstract

Management of operating nuclear power plants greatly relies on structural integrity assessments for safety critical pressure vessels and piping components. In the present work, residual stress profiles of girth welded austenitic stainless steel pipes are characterised using an artificial neural network approach. The network has been trained using residual stress data acquired from experimental measurements found in literature. The neural network predictions are validated using experimental measurements undertaken using neutron diffraction and the contour method. The approach can be used to predict through-wall distribution of residual stresses over a wide range of pipe geometries and welding parameters thereby finding potential applications in structural integrity assessment of austenitic stainless steel girth welds.

Keywords: residual stress profile; girth welds; stainless steel; neural network; neutron diffraction; contour method

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