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Numerical prediction and validation with experimental study of fatigue life evaluation of 170 mm outer diameter stainless straight pipe subjected to torsion and bending

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The loading on the piping component in nuclear power plant is predominantly bending in nature which is accompanied by some torsional loading during the operation. The pipe experiences higher crack growth rate due to the torsional loading along with bending. The numerical simulations were carried out 170 mm outer diameter SA312 Type 304 LN stainless steel straight pipe using finite element based ABAQUS software. Pipe and loading arm were modeled separately and assembled according to the torsion and bending loading. The stress intensity factor values were obtained for every 0.5 mm incremental crack depth and the numbers of cycles were calculated using Paris' law. In addition to the numerical simulation, the experimental fatigue test was carried out on 170 mm outer diameter stainless steel straight pipe subjected to torsion and bending loading. The crack depth was monitored using alternating current potential drop technique. The numerical results compared well with the experimental results.

Biography

Veerarajan Selvakumar is currently pursuing his PhD from National Taipei University of Technology, Taiwan. He did his Master of Engineering project under the guidance of D M Pukazhendhi at Fatigue and Fracture Laboratory, CSIR-Structural Engineering Research Center, Chennai, India.

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