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E-BABE- Influence of the vertical flow velocity component on flow-accelerated corrosion in 90° elbow

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Flow accelerated corrosion (FAC), which causes the fracture of the carbon steel piping in the worst cases, is at present one of the most important subjects in coolant systems of fossil and nuclear power plants. Experimental and numerical studies are conducted to investigate the effects of turbulent parameters on flow-accelerated corrosion (FAC) behaviour of low carbon steel at 90° elbow. The experimental testing of flow-accelerated corrosion behaviour was carried out by the array electrode technique in a circulating loop system. The measurement of electrochemical corrosion test shows that the maximum corrosion current density is located in the extrados side of test section while the minimum value appears at the intrados side, consistent with the typical flow-accelerated corrosion induced failures of turbine plant pipelines and equipment. In addition, the flow behavior inside piping components of the loop system were sufficiently simulated by computational fluid dynamics (CFD) simulation and turbulent parameters were compared with flow-accelerated corrosion rate. With respect to the comparison of the results, the radius direction local velocity component (v_r) is in good accordance with the configuration of corrosion current density. Therefore, the present results reveal the radius direction local velocity component is a major parameter for predicting the pipe-wall thinning of the 90° elbow due to flow-accelerated corrosion.

Biography

Xiaodong Si is a PhD candidate at School of Energy and Environment, Southeast University since 2016. He has published more than 17 papers in reputed journals and his current research is mainly focus on flow-accelerated corrosion of the carbon steel piping.

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