

Abstract

Mohamed N. El-Shaib

Numerical and experimental investigations of erosion-corrosion in carbon-steel pipelines

Pipelines are considered a vital mean of fluid transportation for several types of fluids where literature refers to pipeline systems as the veins and arteries of modern life. Understanding the behavior of erosion-corrosion will give hand in anticipating the failure rate and damage location caused due to erosion-corrosion mechanism. This paper discusses the effect of different laminar and turbulent slurry sea water flow regimes with different sand and clay contamination levels. The pipeline flow is examined and simulated using CFD commercial package. Corresponding erosion-corrosion of forty eight experiments are performed. Indeed variation of the used sand and clay particle concentration will affect the erosion-corrosion rate. Sand and clay concentrations varied from nil to 9 grams per liter. Validation of CFD results with experimental results is presented and discussed. Results showed that seawater flow with 9 g/l sand particle concentration had the most significant erosion effect on pipeline at the highest flow regime. Hence, maximum erosion location is determined for all conditions. Regression Equations are developed for erosion rates using experimental data. Deviations between experimental and numerical results are determined.