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Reliability assessment of thick high strength pipelines with corrosion defects

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Abstract

High strength pipelines provide the cost effective design solution for transporting oil and gas especially in the deep sea or arctic area with geological hazards such as semi-permafrost, landslides and seismic activities. Like any conventional pipelines, failures occur frequently in pipelines with corrosion and thus this phenomenon in pipelines are given high priority in assessing the safety of high strength pipelines. Reliability assessment of the thin pipelines following design guidelines by DNV has been the focus of the studies by many researchers for a long time. However, the reliability assessment of the thick pipelines has not been conducted at the same extent. Realizing the above fact this research is intended to investigate the structural reliability of thick high strength pipelines. Through the study, the extensive reliability analysis is carried out on intact pipe for finding reliability index and sensitivity factors under ten different level of corrosion defect, the influence of various parameter on the burst pressure of the corroded pipes is obtained. The results demonstrated that model uncertainty factor, depth of corrosion and operating pressure are more important parameters in corroded pipelines. The present study can be useful for assessing the integrity of high strength pipelines and plan maintenance activities in future.

