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عنوان مقاله:

Assessment of Offshore Pipeline Reliability against Lateral Buckling

محل انتشار:

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خلاصه مقاله:

Subsea pipelines are used to transport gas and oil around the world. Oil is transported through subsea pipelines at high pressure and high temperature to smooth the way for its flow and to prevent its solidification. The present paper assesses a pipeline located in South Pars Gas Field against lateral buckling. As more and more pipelines operate at higher temperatures (over ۱۰۰°C), the likelihood of lateral buckling becomes more relevant. The uncertainty in the lateral buckling parameters of the pipeline is a source of error in determining effective axial compressive force. Uncontrolled lateral buckling can cause excessive plastic deformation of the pipeline, which can lead to localized buckling collapse or cyclic fatigue failure during operation due to multiple heat-up and cool-down cycles, if it is not properly managed. This research reports the results of a reliability analysis to study and quantify the variations of the reliability index (β) with the main parameters involved during the lateral buckling of the subsea pipelines. Uncertainty is considered in the geometric parameters of the pipeline. The probability of failure (Pf) and the reliability index (β) can be determined by the reliability methods. The First-Order Reliability Method (FORM), the Second-Order Reliability Method (SORM) and the sampling method are the three main methods used here to determine Pf and β. The results show that the pipelines, in the case of lateral buckling and corrosion, will be in safe condition for up to ۳۰ years after construction.

کلمات کلیدی:

Subsea Pipeline, Lateral Buckling, Corrosion, Reliability, Probability of failure

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