

عنوان مقاله:

Reliability Analysis of Subsea Pipeline against Upheaval Buckling

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خلاصه مقاله:

The importance of oil transportation in the maritime industry has increased in recent years due to increased oil and gas production. According to technical and financial aspects, on hydrocarbon transfer methods, the pipelines are the best option for the transfer of oil and gas in the maritime industry. High temperature and high pressure in the pipeline can lead to the buckling. Buckling can either be in the direction of vertical (upheaval) and horizontally (lateral). The uncertainty in the buckling parameters of the pipeline increases error in the uplift and the effective axial compressive force calculation. The existence of these errors in the pipeline design is costly for the project. So reducing the errors can be very important. This paper presents the reliability analyses for studying and quantifying the variation of the reliability index (β) with the main parameters involved during the upheaval buckling of submarine buried pipes caused by high temperature and pressure conditions (HTHP). In this paper, uncertainty is considered in the geometric parameters of the pipeline. PDF and reliability index (β) can be determined by FORM and other. FORM, FOSM and sampling methods are three main methods which are used to account the PDF and reliability index (β). This research shows that among these three methods, for a fixed state, the sampling method has the lowest beta and the highest probability of buckle, which has a higher accuracy than the other methods. For soil cover with a thickness of more than 1000, it is worth noting that by increasing the thickness of the soil cover, more force is required for the upheaval buckling in the pipeline.

کلمات کلیدی:

Upheaval Buckling, Reliability, Subsea Pipeline, Monte Carlo simulation

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