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Investigation of Flow Hydraulic and Free Spanning Length of Marine Pipelines Subjected to Sea Waves

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Abstract

Placement of marine pipelines on the seabed in unburied form causes the formation of free spans along the pipelines. By forming the free span, the interaction between vortex shedding and applied fluid hydrodynamic force to the pipelines increase the possibility of resonance, fatigue and fracture of pipes. So predicting free span length of pipelines that lie in Persian Gulf which are exposed to sea waves (oscilating flows) is our purpose in this research. In this study, the effect of waves on pipeline around flow field will be investigated structurally and hydraulicaly.Flow field and pipe vibration in cross flow direction will be examined by changing some effective parameters like Keulegan - Carpenter number and distance of pipeline from seabed. Finally,for prevention of resonanse, allowable free span length will be determined for different hydraulic and support situations and will be compared to various codes results. The results show that for predicting pipelines allowable free span length in the Persian Gulf area, wave effects as well as current effects should be considered.

Keywords: *Free spanning length, Frequency of vortex shedding, Marine pipelines, Wave, Oscillating flow.*