

# VIV analysis of pipelines under complex span conditions (PDF)

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Title: VIV analysis of pipelines under complex span conditions

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摘要:

Spans occur when a pipeline is laid on a rough undulating seabed or when upheaval buckling occurs due to constrained thermal expansion. This not only results in static and dynamic loads on the flowline at span sections, but also generates vortex induced vibration (VIV), which can lead to fatigue issues. The phenomenon, if not predicted and controlled properly, will negatively affect pipeline integrity, leading to expensive remediation and intervention work. Span analysis can be complicated by: long span lengths, a large number of spans caused by a rough seabed, and multi-span interactions. In addition, the complexity can be more onerous and challenging when soil uncertainty, concrete degradation and unknown residual lay tension are considered in the analysis. This paper describes the latest developments and a ‘state-of-the-art’ finite element analysis program that has been developed to simulate the span response of a flowline under complex boundary and loading conditions. Both VIV and direct wave loading are captured in the analysis and the results are sequentially used for the ultimate limit state (ULS) check and fatigue life calculation.

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