

On the Behavior of Lateral Pipe-Soil Interaction in Ultra-Soft Clayey Soil Using Large Scale-Laboratory Tests

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Abstract

One of the most essential challenges in the deep offshore environments is the lateral pipe-soil interaction movement in very soft soils. Thus, several comprehensive large-scale physical models with dimensions of (2.4 m*2.4 m*1.8 m) have been constructed to examine the behaviour of lateral pipe-soil interaction on a simulated seabed. In this study, large-scale model tests were performed through a special loading frame, using instrumented pipes placed on ultra-soft clayey soil to quantify the lateral pipe-soil interaction by using a precise remote gridding system. The effects of several real field conditions such as pipe end conditions, pipeline material, soft soil shear strength, rate of loading, and pipe size were inspected extensively. It was shown that the fixed-end boundaries developed more resistance up to 50% against lateral displacement in comparison to the free-end boundaries. Moreover, the maximum resistance of the plastic pipe was 64% more than the steel pipe.

Keywords: lateral pipe-soil interaction, ultra-soft soil, remote gridding system, large scale testing

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