

PARAMETRIC STUDY: EFFECT OF TEMPERATURE, BURIAL DEPTH, AND SOIL TYPE ON THE OCCURENCE OF UPHEAVAL BUCKLING IN BURIED OFFSHORE PIPELINE

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ABSTRACT

This final project discusses a case of buckling in relation to avoid the occurrence of upheaval buckling in operating buried offshore pipeline. The discussion in this final project includes the analysis of the effect of temperature, burial depth, and soil type on the occurrence of upheaval buckling. In this final project, analysis is conducted in several conditions, namely at the temperature of 35 C, 60 C, 100 C, pipe burial depth of 1.5 meters, 2 meters, and 3 meters, as well as the soil types of sand and clay. In addition, this final project also discusses the load and stress that occurs in the pipe during the upheaval buckling. Analysis is performed based on the criteria established by DNV OS F101, ASME 31.1, ASME 31.4, and ASME 31.8, while the CAESAR 4.2 software is used for pipeline modeling. The result of the analysis shown that the effect of temperature rise on upheaval buckling is significant, which is indicated by the higher the operating temperature, the greater the possibility of upheaval buckling. Meanwhile, for the influence of soil type and pipe burial depth, it is observed that the higher the soil cohesive value and the deeper the burial depth, the possibility of upheaval buckling is rather small. Based on the computations, the critical load and stress which causes pipe buckling are of 8.7 kN and 361.2 kPa.

Keywords: burried offshore pipeline, critical load, critical stress, temperature, upheaval buckling.