

Quantification of Factors Contributing to Wave-in-Deck on Fixed Jacket Platforms

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Abstract : Wave-in-deck phenomenon for fixed jacket platforms at shallow water condition has been reported as a notable risk to the workability and reliability of the platform. Reduction in reservoir pressure, due to the extraction of hydrocarbon for an extended period of time, has caused the occurrence of seabed subsidence. Platform experiencing subsidence promotes reduction of air gaps, which eventually allows the waves to attack the bottom decks. The impact of the wave-in-deck generates additional loads to the structure and therefore increases the values of the moment arms. Higher moment arms trigger instability in terms of overturning, eventually decreases the reserve strength ratio (RSR) values of the structure. The mechanics of wave-in-decks, however, is still not well understood and have not been fully incorporated into the design codes and standards. Hence, it is necessary to revisit the current design codes and standards for platform design optimization. The aim of this study is to evaluate the effects of RSR due to wave-in-deck on four-legged jacket platforms in Malaysia. Base shear values with regards to calibration and modifications of wave characteristics were obtained using SESAM GeniE. Correspondingly, pushover analysis is conducted using USFOS to retrieve the RSR. The effects of the contributing factors i.e. the wave height, wave period and water depth with regards to the RSR and base shear values were analyzed and discussed. This research proposal is important in optimizing the design life of the existing and aging offshore structures. Outcomes of this research are expected to provide a proper evaluation of the wave-in-deck mechanics and in return contribute to the current mitigation strategies in managing the issue.

Keywords : wave-in-deck loads, wave effects, water depth, fixed jacket platforms

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