

Calculation of dynamic amplification factor for jack-up structures

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Abstract

Jack –up structures are used in different locations during their lifetime. To understand their sensitive behaviors to combined loads in different sites, there is a need to deploy different analytical methods with different approaches. Some simplified and practical methods have been developed to perform the design and analysis procedure in a relatively short period of time. One of the common approaches to study the dynamic behavior of jack-up structure is using the dynamic amplification factor (DAF). It is used as an important indicator of the degree of dynamic response to be expected. DNV and ISO provided some approximate formulas to calculate DAF [1 & 2]. Accordingly, DAF will be studied whether is a need to perform dynamic analyses or not. In the case that dynamic analysis is demanded, an inertial load set can be determined from the dynamic amplification factor. Then, the dynamic analysis can be substituted by quasi-static analysis with an inertial load set which simulate the effects of the dynamic loads. Therefore, accurate calculation of DAF is crucial for any further studies on the structural behavior. In this paper, DAF is directly calculated using the maximum dynamic response and the maximum quasi-static response of the jack up structure; and then they are compared with the values obtained by approximate formulas. Five soil-structure models are used to find the influence of the foundation model on DAF. The soil properties and load conditions are mainly based on the Persian Gulf characteristics [3].

Keywords: Dynamic amplification factor, jack-up structure.