

Sensitivity Analysis of Pile-Founded Fixed Steel Jacket Platforms

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Abstract : The sensitivity of the seismic response parameters to the uncertain modeling variables of pile-founded fixed steel jacket platforms are investigated using tornado diagram, first-order second-moment, and static pushover analysis techniques. The effects of both aleatory and epistemic uncertainty on seismic response parameters have been investigated for an existing offshore platform. The sources of uncertainty considered in the present study are categorized into three different categories: the uncertainties associated with the soil-pile modeling parameters in clay soil, the platform jacket structure modeling parameters, and the uncertainties related to ground motion excitations. It has been found that the variability in parameters such as yield strength or pile bearing capacity has almost no effect on the seismic response parameters considered, whereas the global structural response is highly affected by the ground motion uncertainty. Also, some uncertainty in soil-pile property such as soil-pile friction capacity has a significant impact on the response parameters and should be carefully modeled. Based on the results, it is highlighted that which uncertain parameters should be considered carefully and which can be assumed with reasonable engineering judgment during the early structural design stage of fixed steel jacket platforms.

Keywords : fixed jacket offshore platform, pile-soil structure interaction, sensitivity analysis

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