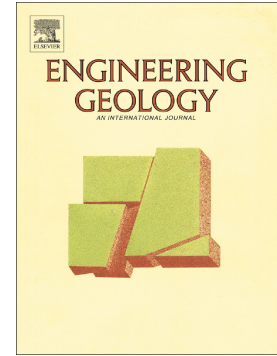


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The bearing capacity of spudcan foundations under combined loading in spatially variable soils

Li Li^a; Jinhui Li^{a,*}; Jinsong Huang^b; Hongjun Liu^a; Mark J. Cassidy^c

ABSTRACT: Predicting the bearing capacity of a spudcan foundation under combined vertical (V), horizontal (H) and moment (M) loads is a challenging problem encountered by geotechnical engineers. In previous studies the combined VHM capacity was defined for a uniform soil profile, ignoring any variability in soil stratification and properties. In offshore conditions, however, both the soil profile and soil properties vary spatially. Therefore, it is of interest to account for the spatial variability of soil in the analysis of the bearing capacity of a spudcan. It is shown in this paper how the spatial variability of a clay affects the bearing capacity of a deeply buried spudcan foundation under combined loadings. Three-dimensional random fields are generated to model the spatial variability of undrained shear strength of clay and combined with a non-linear finite element analysis to investigate and define the VHM failure envelope of a spudcan foundation. Because of the random nature of soils VHM failure envelopes of different probability of occurrence are proposed. Results from this study provide guidance to the practical assessment of spudcan foundations in spatially varied soil conditions that can be encountered offshore.

Keywords: Spudcan foundation; Bearing capacity; Clay; Failure envelope; Random field; Risk.

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