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Numerical Analysis of Bearing Capacity of Caissons Subjected to Inclined Loads

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Abstract : A finite element modeling for determination of the bearing capacity of caissons subjected to inclined loads is presented in this paper. The model investigates the uplift capacity of the caisson with varying cross sectional area. To this aim, the behavior of the soil is assumed to be elasto-plastic, and its failure is controlled by Modified Cam-Clay failure criterion. The simulation takes into account the couple analysis. The approach is verified using available data from other research work especially centrifuge data. Parametric studies are subsequently performed to investigate the effect of contributing parameters such as aspect ratio of the caisson, the loading rate, the loading direction angle, and points where the external load is applied. In addition, the influence of the caisson geometry is taken into account. The results show the bearing capacity of the caisson increases with increasing the taper angle. Hence, the pullout capacity will increase using the same material. In addition, the bearing capacity of caissons strongly depends on the suction that is generated at tip and in sealed surface on top of caisson. Other results concerning the influencing factors will be presented.

Keywords : aspect ratio, finite element method, inclined load, modified Cam clay, taper angle, undrained condition
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