Partially-drained loading of shallow foundations on sand

by

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A thesis submitted for the degree of

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Abstract

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Wave loading on offshore structures founded on sand can result in partially-drained response of the foundation soil. The characteristics of the rate of loading, the permeability of the soil, and the size of the foundation affect the degree of partial drainage. Partial drainage refers to situations where pore pressures develop in the soil, and the response of the soil is neither fully drained nor undrained. This thesis is concerned with the effects of loading rate, and consequent drainage, on the behaviour of a flat circular footing that is founded on the surface of a saturated sand base. The results of physical tests performed in the laboratory on a model-size footing are reported. The footing was founded on oil-saturated fine sand and was subjected to combined loading. The effect of the vertical, horizontal, and rotational displacement rate are reported. The response of the footing is analysed in the context of existing drained foundation models that are based on work hardening plasticity theory. The rate dependency of the vertical load:deformation behaviour and the combined load yield surfaces is described.

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