

Numerical Analysis on the Dynamic Interaction of Combined Pile-Raft Foundations on Liquefaction Prone Soils

N. Gluck¹, R. Farhat¹, R. Eid¹, U. Tzadka¹

¹ Academic College of Engineering, Sami Shamoon
Beer Sheva, Israel

mikig@sce.ac.il, rinaft@sce.ac.il, ramiei@sce.ac.il, uriz@sce.ac.il

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ABSTRACT

During the last decades, significant effort has been invested into the achievement of earthquake resistant structures. Due to the variety of the occurring seismic movements and the amplification phenomena the damages were beyond the knowledge of the designers to ensure the desired structural stability.

One of the causes of structural damage was the soil behavior on which the structures were built. A very dangerous phenomenon is the liquefaction occurring in sandy soils due to seismic movements. There are a lot of examples of the dangerous behavior of soil which went under liquefaction and caused the tilting of buildings, surfacing of submerged tanks, destruction of bridges and highways.

A recent trend is to provide combined pile raft foundation mainly to reduce the structural settlement in weak soils. The solution is recommended mainly for gravitational loads of tall buildings but the dense piles which compact the foundation soil and will diminish the risk of liquefaction.

The soil structure interaction was simulated and conclusions were drawn by means of FEM simulation. The building codes do not contain the combined raft-pile solution for the achievement of foundation of structures. Most of the actual solutions have been implemented for high rise buildings built on weak soils to reduce settling of the structure. No application was implemented on sandy soil in liquefaction prone areas.

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