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Numerical Analysis of Soil Geotechnical Parameters on Performance of Concrete Cooling Towers by Finite Element Method(Case Study: Of Mashhad Cooling Towers)

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abstract

Nowadays, more and more ring footings are used in practice special for axi-symmetric structures. In this paper, a numerical analysis was performed using PLAXIS software for calculating bearing capacity and settlement of ring footing. The parameters used in this analysis are the results of geotechnical studies of Mashhad cooling tower. The analysis was carried out using Mohr-Coulomb's criterion for soil. The Bearing capacity was calculated for smooth and rough ring footing and then the bearing capacity factors were calculated. The analysis indicated that the bearing capacity of rough ring footing is obviously higher than the bearing capacity of smooth footing. Finally, the results were compared with those available in the literature.

Keywords: settlement, Finite Element Method., bearing capacity, ring footing.

Introduction

Geotechnical engineers often deal with layered foundation soil, which is non-homogeneous in nature but can be simplified in representation as distinct homogeneous layers for engineering purposes. The failure mechanism of layered soil depends on the thickness and soil properties of each layer. In some cases where the top layer is relatively thick and consists of weak soil, the failure mechanism may be limited in the top layer only and the strength of the remaining lower layers has no influence. In many other cases, however, the failure mechanism may involve two or more layers.

The bearing capacity and settlement for both strip and circular footings have already been one of the most highly interesting areas in geotechnical engineering for researchers and practical engineers. Defining the correct bearing capacity of the footing is a very important factor in economical terms. A lot of observations have been made in the literature in order to calculate bearing capacity of strip and circular footings using the limit equilibrium method [1, 2]. In recent years, numerical methods, such as finite element method (FEM) [3, 4] and the finite difference method [5, 6], have been widely used to compute the bearing capacity of strip and circular footings. Nowadays, more and more ring footings are used for axi-symmetric structures such as