

the Impact of Combined Loading on Lateral Capacity and Group Efficiency of Helical Piles

Authors : Hesham hamdy abdulmohsen, Ahmed Shawky Abdel Aziz, Mona Fawzy Aldaghma

Abstract : Helical piles have gained significant attention as efficient alternatives for deep foundations due to their rapid installation process and dual functionality in compression and tension. They experience various combinations of axial and lateral loads. While extensive research has explored helical pile behavior under individual axial or lateral loads, the effects of combined axial compression and lateral loads still need further study. This paper compares experimental and numerical (PLAXIS-3D) results for vertical helical-pile groups under combined loads. The study aims to clarify the impact of key factors, including helix location and lateral load direction, on the lateral capacity of helical-pile groups and, consequently, their overall efficiency. The study concludes that the lateral capacity of the helical-pile group significantly depends on the helix location within the pile shaft length. Optimal lateral performance occurs when helices are positioned at a depth ratio of $H/L = 0.4$. Furthermore, rectangular plan distribution groups exhibit greater lateral capacity when subjected to lateral loads aligned with their long axis. The presence of vertical compression loading enhances the lateral capacity of the group, with the specific enhancement depending on the value of the vertical compression load, lateral load direction, and helix location.

Keywords : experimental, numerical model, lateral loading, group efficiency, helical piles

Conference Title : ICSMGE 2024 : International Conference on Soil Mechanics and Geotechnical Engineering

Conference Location : Sydney, Australia

Conference Dates : September 05-06, 2024