

Behavior of Laterally Loaded Multi-Helix Helical Piles Under Vertical Loading in Cohesive and Cohesionless Soils

Authors : Mohamed Hesham Abdelmohsen, Ahmed Shawky Abdul Azizi, Mona Fawzy Aldaghma

Abstract : Helical piles are gaining popularity as a viable deep foundation alternative due to their quick installation and multipurpose use in compression and tension. These piles are commonly used as foundations for constructions such as solar panels, wind turbines and offshore platforms. These structures typically transfer various combinations of loads to their helical-pile foundations, including axial and lateral loads. Further research is needed to determine the effects of loading patterns that may act on helical piles as compounds of axial compression and lateral stresses. Multi helical piles are used to increase the efficiency of these piles. In this study, it investigate the behavior of laterally loaded helical piles with multiple helices when subjected to vertical loading conditions in both cohesive and cohesionless soils. Two models of intermediate shaft rigidity are studied with either two or three helices. Additionally, the vertical loading conditions were altered between successive and simultaneous loading. The cohesionless soil is sand with medium density and the cohesive soil is clay with medium cohesion. The numerical simulations reveal that helical piles exhibit different behavior in cohesive soil compared to cohesionless soil.

Keywords : helical piles, multi-helix, numerical modeling, PLAXIS 3D, cohesive soil, cohesionless soil

Conference Title : ICSMGE 2025 : International Conference on Soil Mechanics and Geotechnical Engineering

Conference Location : Cairo, Egypt

Conference Dates : December 13-14, 2025