

Utilization of Fins to Improve the Response of Pile under Torsional Loads

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Abstract : Torsional loads from offshore wind turbines, waves, wind, earthquakes, ship collisions in the maritime environment, and electrical transmission towers might affect the pile foundations. Torsional loads can also be caused by the axial load from the sustaining structures. The paper introduces the finned pile, an alternative method of pile modification. The effects of torsional loads were investigated through a series of experimental tests aimed at improving the torsional capacity of a single pile in the sand (where sand was utilized in a state of medium density ($D_r = 50\%$), with or without fins. In these tests, the fins' length, width, form, and number were varied to see how these attributes affected the maximum torsional capacity of the piles. We have noticed the torsion-rotation reaction. The findings demonstrated that the fins improve the maximum torsional capacity of the piles. It was demonstrated that a length of 0.6 times the embedded pile's length and a width equivalent to the pile's diameter constitute the optimal fin geometry. For the conventional pile and the finned pile, the maximum torsional capacities were determined to be 4.12 N.m. and 7.36 N.m., respectively. When subjected to torsional loads, the fins' presence enhanced the piles' maximum torsional capacity by almost 79%.

Keywords : clean sand, finned piles, model tests, torsional load

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