

Behavior of free and fixed headed piles subjected to lateral soil movement

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Abstract

Given extensive study conducted to investigate the response of free headed passive piles in sand subjected to lateral soil movement. The effect of pile head fixity condition was not often considered and systematically studied. For this reason, six tests were carried out on an aluminum pipes with a diameter of 30 mm and wall thickness of 1.4 mm embedded in sand soil. A specially designed apparatus for the laboratory model tests was manufactured to simulate piles subjected to triangular profile shape of lateral soil movements. Two typical pile head conditions (i.e., free and fixed headed conditions) and three different movable to stable depth (L_m/L_s) ratios were considered in these tests. Ten pairs of strain gauges attached at different locations along the pile shaft to measure the bending moments and deformations developed along the pile length. The results showed that the restrained of pile head (for fixed headed condition) leads to reduce the maximum positive bending moment by (18-24%), as compared with that of the free headed pile. Also the pile deflection and rotation along the shaft of fixed headed pile were very different as compared with free headed case.