Two Pile Driving Techniques: Top and Bottom Hammering

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]Abstract

Piled foundations with large diameters are usually used for platform foundations and other offshore structures. In these situations, piles are normally driven into the ground. This paper contributes to investigate the feasibility of bottom hammering instead of traditional top hammering. To this aim, Plaxis 7.2 software is used to simulate the pile driving phenomenon. The large diameter pile is assumed to be made of steel. The pile material is assume to be linear, elastic, and of circular cross sectional area. The soil behavior is assumed to be elasto-plastic and its failure is controlled by the Mohr-Coulomb failure criterion. The pile is driven to the ground under the same released energy either by top or bottom hammering. The results on driving stresses and sets will be presented.

Keywords : Pile driving, wave equation, top and bottom hammering, driving stress, set

1.INTRODUTION

Piles are used for platform foundations and other offshore structures where normally soft deposits are present. In these situations, piles are normally driven into the ground. Smith (1962) developed a mathematical solution to the wave equation to solve complex pile driving problems. This method has been modified and refined since then. In pile driving analysis, the driving resistance is calculated from the analysis of stress waves measured near the pile head. In the traditional top hammering, the incident wave is quickly influenced by the shaft friction wave making the evaluation of driving resistance difficult. A new technique to drive tubular piles by an impact hammer inside the pile has been developed and tested in France by some contractors. According to Arentsen et al. (1996), this new technique has confirmed by performing field tests, resulting in the reduction of noise $(20-30dBA)$ and the opportunity to save steel. Also, a reduction in driving time and a higher bearing capacity has been observed during a test program upon using this technique.