MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

DEPARTMENT OF CONSTRUCTION SCIENCES | FACULTY OF ENGINEERING LTH | LUND UNIVERSITY

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PRESENTATION
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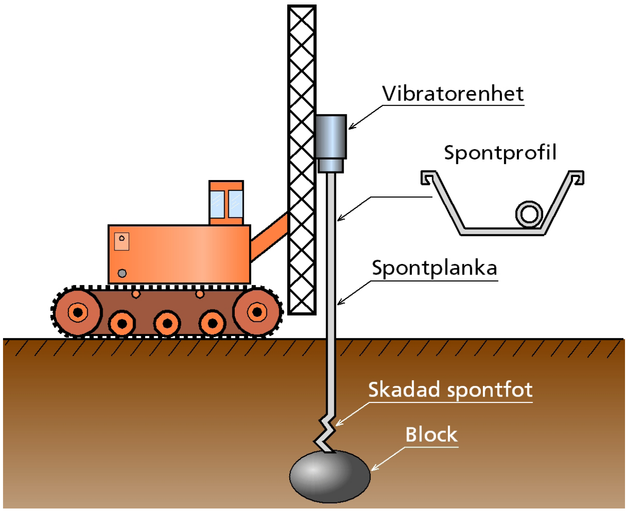
DEVELOPMENT OF STOP CRITERION FOR VIBRATORY DRIVING OF STEEL SHEET PILES



BACKGROUND

When excavating soil for a construction project, retaining walls are often used to prevent soil instability. One category of retaining walls are steel sheet piles. These sheet piles are usually vibrated into the ground, due to the efficiency and low cost. This method is especially convenient when the sheet piles are driven trough soft soil. In parts of Sweden, however, the most common type of soil is the glacial till, that is generally very compact and contains a large range of grain sizes, where large grains such as cobbles and boulders are not unusual. When the sheet pile is vibrated through the soil and hit an obstacle, i.e., a cobble or boulder, there is a risk that the steel sheet pile will be damaged. However, in today's method of vibratory driving, there is no stop criterion designed to avoid this risk. When a sheet pile is damaged the driving is usually stopped, and the sheet pile needs to be extracted and replaced, which is both expensive and time consuming. A method of accurately detecting those situations that could lead to damage of the sheet piles would thus save time, money and resources.

PURPOSE

This master's thesis aims to investigate the possibility of developing a stop criterion for vbratory driving of steel sheet piles by studying how dynamic analysis can be used to detect situations that could lead to damage to the sheet piles. The two main questions that will be investigated are: Which impacts can result in damage to the sheet piles, and how can hazardous impacts be detected?

METHOD

A uniaxial model of the steel sheet pile and vibrator will be created to study if and how the vibratory driving process and the impact phase can be described with a simple model. Furthermore, a numerical finite element model of the sheet pile hitting an obstacle will be created to simulate the driving process and impact phase. Different types of eccentric impacts will be investigated in both models to determine which impacts can result in damage to the sheet piles. Finally, the models will be used to study how the hazardous impacts can be detected.

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