

Detection of plastic deformation during the installation of offshore monopiles

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Description:

The demand for offshore wind energy has seen a dramatic increase of the past decade, resulting in the construction of large offshore wind parks. Monopile foundations are the most common support structures for the wind turbines in these parks. During the installation these piles are hit multiple times with an hydraulic hammer. Each blow creates a stress wave that propagates down the pile transporting the hammer energy towards the soil.

Current models of the pile driving process assume that material of the monopile behaves in a linear elastic manner. However, from practice it is known that plastic deformations occur close to the pile top due to the high stresses in this region. These regions of plastic deformation can have a negative influence on the expected lifetime of the support structure of the offshore wind turbine. Therefore, understanding the non-linear material behaviour of the pile will contribute to improved predictions of the expected lifetime of monopiles.

Goal:

The goal of this research is to include non-linear material behaviour of the monopile into a model of the installation process. With this improved model the occurrence of plastic deformation can be monitored during the installation of the monopile.

Sponsors:





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