

Bengt Broms Lecture by Knut H. Andresen

Soil behaviour under cyclic loading and its importance for foundation design – knowledge from offshore geotechnical engineering

The presentation is based on more than 40 years of experience with foundation design of offshore platforms for the oil and gas industry and more recently with foundation design of offshore wind power structures. Knowledge about cyclic soil behavior is essential for the foundation design of offshore platforms, and significant effort has been put into understanding cyclic soil behavior and to develop soil models and foundation design procedures that account for cyclic soil behavior.

There are differences between offshore cyclic loading conditions and other cases with cyclic loading, like high-speed railways, but the fundamental behavior is the same, and much of the knowledge from offshore can be transferred and applied in general.

The presentation gives an overview of cases with cyclic loading and identifies the main foundation design aspects where it is important to account for cyclic effects, like bearing capacity, slope and embankment stability, soil stiffness in dynamic analyses, cyclic displacements, and increased permanent displacements and settlements. The cyclic soil parameters needed to address these foundation issues are identified. After the fundamental behavior of soils under cyclic loading is explained, it is demonstrated how the different parameters that are needed can be determined from laboratory tests.