Effect of marine growth and damage on modal parameters of a monopile test structure

Dr.-Ing. Mahmoud Jahjouh*
**Institute of Structural Analysis, Leibniz Universität Hannover, Hannover, Germany City, Country, +49-511-762-4393, m.jahjouh@isd.uni-hannover.de*

Abstract

The importance of Structural Health Monitoring (SHM) systems on offshore wind turbines are subjected to harsh loads and Environmental and Operational Conditions (EOCs) that could induce damage, underlying the paramount importance of a Structural Health Monitoring (SHM) system to track the current health of the structure and act as an early warning system against possible damage propagation.

Although the majority of SHM techniques are vibration-based and utilize modal parameters, they often suffer inaccuracies due to the fact changes in EOCs have significant effects on modal parameters that may in some cases exceed the effect of damage. An example of such changing EOCs is biofouling, which is a continuous increase of marine growth layers near the water line with time.

Thus, the effect of marine growth on the modal parameters of a monopile test structure is investigated in this study in order to determine common characteristics that could be used to distinguish between changes in modal parameters corresponding to marine growth and those corresponding to actual damage.

These tests are implemented in a wave basin, where the structure is subjected to a variety of wave heights and periods.

The results show some distinguishing characteristics between the effect of marine growth and damage. Whereas a significant impact of marine growth on the second vibration mode was determined, damage was found to affect the first mode.