

Measurement Equipment for the AU Wave Flume

Research and education in mapping of ocean waves and validation of Light Detection and Ranging (LiDAR) equipment

The group of Structural Dynamics and Monitoring at the Department of Civil and Architectural Engineering, Aarhus University receives a donation from the *COWifonden* for the purchase of various measurement equipment including a High-Speed Camera and an Acoustic Doppler Velocimetry (ADV) device. The equipment will be used for research and educational activities on mapping ocean waves, in combination with a LiDAR system.

The green energy transition will require the deployment of advanced technologies such as offshore wind turbines, wave energy devices and floating solar energy systems. Therefore, enhanced knowledge of the waves near the offshore structures is of vital importance. Ocean waves have been measured and studied for decades; nevertheless, the contemporary systems have limitations. Therefore, a new measurement system is investigated, which would increase this knowledge and specifically enable a further understanding of the waves that break.

LiDAR is a powerful tool for mapping over an area, which will provide the key to understanding the wave properties - critical for designing structures placed in the open ocean. The new measurement equipment will be used in the AU Wave Flume at Aarhus University, initially for LiDAR measurement validation. The wave gauges are necessary to accurately measure the surface elevation. The Acoustic Doppler Velocimetry will be used to obtain wave kinematics, which is an important parameter in the determination of wave loads acting on offshore structures. Thereby the characterization of the waves measured by the LiDAR can be coupled to a parameter closely related to wave loading and energy. The knowledge of wave kinematics is moreover useful for wave energy converters.