Transmission of wave energy through an offshore wind turbine farm - DTU Orbit
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Transmission of wave energy through an offshore wind turbine farm
The transmission of wave energy passing an offshore wind farm is studied. Three effects that can change the wave field
are analysed, which is the A) energy dissipation due to drag resistance, B) wave reflection/diffraction from structures, and
C) the effect of a modified wind field inside and on the lee side of the wind farm. The drag dissipation, A), is quantified by a
quadratic resistance law. The effect of B) is parameterised based on 1st order potential theory. A method to find the
amount of reflected and transmitted wave energy is developed based on the panel method WAMIT™ and a radiation
condition at infinity. From airborne and Satellite SAR (Synthetic Aperture Radar) a model has been derived for the change
of the water surface friction C) inside and on the lee side of the offshore wind farm. The effects have been implemented in
a spectral wind wave model MIKE21 SW, and a parametric study to compare the 3 different processes has been carried
out. The method to study reflection/diffraction can be used for any type of offshore structure, vessel or a number of
structures, as long as the assumptions for the use of potential wave theory are valid, and the effect of the modified wind
field on the water surface friction is known.

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