Abstract Submitted
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A wide-spacing approximation model for the reflection and transmission of water waves over an array of vertical obstacles[1] ALEXIS MÉRIGAUD, BENJAMIN THIRIA, RAMIRO GODOY-DIANA, PMMH, ESPCI Paris, CNRS, Sorbonne University, University of Paris — With a view to modelling and optimisation of wave energy farms, a simple recursive formulation is proposed for the reflection and transmission of plane water waves by a number of rows of vertical obstacles, under the wide-spacing approximation. The approach accommodates dissipation along the wave propagation direction. The proposed recursive model is validated by means of experiments in a small-scale wave flume, where waves are reflected and transmitted by one, two and three rows of vertical, flexible blades. For the special case of identical, regularly-spaced rows, well-known analytical formulae are then discussed for the global reflection and transmission coefficients, as a function of the reflection and transmission properties of individual rows. In a 'non-dissipative' case, the well-known fact that discrete values of the row-to-row distance L completely cancel reflection is retrieved, as well as the existence of 'band-gap' intervals, i.e. intervals for L where reflection is high, with maximum reflection occurring away from the Bragg condition. In contrast, when dissipation takes place, reflection is always nonzero, and, as the number of rows tends to infinity, forms Bragg peaks, reaching unity when L is a multiple of half a wavelength.

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