Multi-directional random wave interaction with an array of cylinders - DTU Orbit (08/11/2017)

Multi-directional random wave interaction with an array of cylinders

Based on the linear theory of wave interaction with an array of circular bottom-mounted vertical cylinders, systematic calculations are made to investigate the effects of the wave directionality on wave loads in short-crested seas. The multi-directional waves are specified using a discrete form of the Mitsuyasu-type spreading function. The time series of multi-directional wave loads, including both the wave run-up and wave force, can be simulated. The effect of wave directionality on the wave run-up and wave loading on the cylinders is investigated. For multi-directional waves, as the distribution of wave spreading becomes wider, the wave run-up at some points around the cylinders is found to increase. This suggests that multi-directional wave run-up tends to be larger than unidirectional wave run-up. In addition, the wave directionality has a significant influence on the transverse force. The biggest transverse force is found to occur on the rear cylinder rather than the front one. This is quite different from the results in unidirectional waves and should be paid much more attention in the design of offshore structures. At last, the possibility of the near-trapping under the multi-directional random waves is investigated. It is found that the near-trapping also occurs for multi-directional wave conditions. (c) 2015 Elsevier Ltd. All rights reserved.

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