EVALUATION OF GREEN WATER LOADS ON OFFSHORE STRUCTURES USING A NUMERICAL WAVE BASIN

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ABSTRACT

Green Water and Wave impacts are amongst the most severe and dangerous loads that effect offshore structures. Even if many design procedures are well established, they can over or underestimate the structural loading in complex conditions as they are outside of their application scope. This therefore leads to over designed and expensive structures, or to under designed structures leading to dangerous situations. The calculation of complex structure loadings is therefore a key issue for engineering companies.

HydrOcean, in cooperation with Ecole Centrale de Nantes and NextFlow, has developed the SPH-flow software, based on the SPH method.

This paper details the development and validation of a methodology dedicated to the evaluation of green water loads on offshore structures. This methodology was developed in cooperation with Total and Technip. Comparisons with experimental results are provided. The following aspects will be addressed in this article:

• Validation of wave propagation by the SPH method and development of a forcing with a Higher-Order Spectral method to simulate open sea.
• Validation on slamming and green water cases. The experiments were performed in the wave tank of the Ecole Centrale de Nantes. SPH calculations are performed under similar conditions, to compare the results obtained with the experiments.
• Application of the developed and validated methodology for the assessment of green-water event on offshore structures.