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NUMERICAL SIMULATION OF OCEAN WATER WAVES IN A NUMERICAL WAVE TANK

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Abstract. Offshore wind turbines are getting wide spread as an alternative to onshore ones. The prediction of the dynamic loads excerted by the impact of ocean waves on the pile of the turbine is a key factor to be considered in the structural analysis. To accurately estimate these loads it is important to reproduce as close as possible the water waves existing in the environment where the turbine is operating. As a first step of analysis, the fluid dynamic analysis of different types of well known water wave models (e.g. standing wave, solitary wave and focused wave groups) are reproduced in a numerical wave tank with the aim of evaluating the capabilities of two scientific numerical codes, namely Code Saturne and OpenFOAM. Both of them are open source multiphysics code, based on the finite volume method. OpenFOAM uses the Volume of Fluid approach to simulate the two fluid phases, namely air and water. On the other hand, Code Saturne uses a single phase ALE strategy to take into account the water domain deformation. The results computed with these codes will be compared to analytical solutions available in the literature as well as with numerical solutions computed with other fluid solvers.

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