

NUMERICAL MODELING OF PROBLEMS ON OFFSHORE ENVIRONMENT (MODELAÇÃO NUMÉRICA DE PROBLEMAS EM AMBIENTE OFFSHORE)

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ABSTRACT

The aim of this mini-symposium is to present the relevant research works developed in the field of numerical modelling of problems related to the study of structures located on offshore environment, whether they are used for wind turbines or for oil and gas industry. The design of these structures has to satisfy rigorous requirements, taking into account complex geotechnical and environmental conditions. Additionally, in case of oil and gas industry, accidental actions associated to process operations, as explosions, fire and impact of supply vessels on the structure, should be considered during the design.

Initial studies to design offshore structures were based on experimental evidences, which demonstrated to be a good method to predict its structural response under large varieties of actions. However, because experimental tests are very expensive and limited, it is necessary to use scale models. These models can affect the results caused by the scale effects; additionally, it is needed to simplify the properties of the structural material which can affect the structural response, and finally, the measured results are limited.

Nowadays, these problems are also studied using numerical approaches. They makes possible: i) to study the system in real scale, ii) to modelling the structural response in detail and iii) to quantify the fluid and the structural behavior at any time and at any point of the model. In this symposium, numerical modelling applied to these problems will be discussed considering Computational Fluid Dynamics (CFD) and Computational Solid Mechanics (CSM). CFD could be used to examine fluid flow (wave impact, air gap under offshore platform and influence of the wind), as well as heat transfer behaviour (gas temperatures, smoke flow and fire spread). CSM allows determining the stress and deformation on the structure caused by the applied loads. The coupled Fluid-Structure Interaction (FSI) between these two analyses is one of the main challenges in the field of offshore problems.