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Ship operation and failure mode analysis using a maneuver simulator

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In a ship or floating structure operation the agents that contribute to the systems behaviour are not only those derived from fluid-structure interaction, but also the ones linked to mooring-control line set-up evolution and human interaction. Therefore, the analysis of such systems is affected by boundary conditions that change during a complete operation. Frequently, monitoring techniques in laboratory (model) and field (prototype) are based in different instrumental techniques adding difficulty to data comparison and, in some cases, inducing precision and repeatability errors. For this reason, the main aim of this study is to develop the methods and tools to achieve a deep knowledge of those floating systems and obtain capabilities to optimize their operationally thresholds.

This abstract presents a methodology and an instrumental system applicable both in field and laboratory: SRECMOCOS Project (Small scale REal-time Caisson MOnitoring and COntrol System). SRECMOCOS compiles three modules. For the monitoring and control of the structure it has been developed a synchronized open and modular microcontroller-based electronic system that comprises sensors, to monitor agents and reactions, and actuators to perform pertinent actions after processing the sensors' data.
A secondary objective has been to design and implement a global scaled simulator (1:22), at the 3D basin of The Harbour Research Lab at Technical University of Madrid, in which climatic agents and those derived from the rig/maneuvering setup and the structural design were included. The particular case of Campamento's drydock, in Algeciras Bay (Spain), has been used to apply and validate the methodology.

SRECMOCOS Project conjugates control, monitoring and wireless communication systems in a real time basis, offering the possibility to register and simulate all the parameters involved in port operations. This approach offers a step forward into a monitoring strategy to be included in monitoring, simulation, prediction and exploitation protocols. This methodology allows easy adaptability and development of the system to different applications versus ad hoc systems, usually very specific, expensive and difficult to modify.