Title: **The Next Level DP Capability Analysis**

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Abstract

The traditional DP Capability Analysis (DPCap) as described in IMCA M140 is the current industrial standard for analyzing a vessel's station-keeping capability. These analyses are used for vessel design, charter agreements and operational planning. A DPCap analysis is inherently quasi-static, meaning that all dynamic effects must either be neglected or handled by safety factors. Hence, the DPCap analysis can only balance the mean environmental forces with the mean thruster forces, and cannot account for e.g. the transient conditions during a failure and recovery after a failure.

Dynamic Capability (DynCap) is the next level DP capability analysis tool. DynCap is based on systematic time-domain simulations with a sophisticated 6 DOF vessel model, including dynamic wind and current loads, 1st and 2nd order wave loads with slowly-varying wave drift, a complete propulsion system including thrust losses, power system, sensors, and a DP control system model. Most of the limiting assumptions needed for the traditional DPCap analysis are removed, yielding results much closer to reality.

It is also possible to tailor the acceptance criteria in the analysis to the requirements for each vessel and operation, such as station-keeping footprint, sea-keeping criteria, dynamic power load, and transient motion after failure. This paper presents the DynCap analysis methodology and a comparison between the capability plots obtained with the traditional DPCap and the DynCap analysis methods for three different vessel designs.

The paper also demonstrates how the DynCap methodology can be used in a fuel consumption and operability analysis as well as analyzing the transient motion after a failure, and finally presents a model-scale experimental verification of the concept.

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