

Experimental investigation of asymmetrical propeller behavior of twin screw ships during maneuvers

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Twin screw ships may experience considerably asymmetrical propeller functioning during maneuvers. This phenomenon may result in large power fluctuations during tight maneuvers, with increases of shaft torque up to and over 100% of the steady values in straight course with considerable unbalances. A multi-year joint research project supported by Italian Navy has been set up in order to deeply investigate the phenomenon, potentially dangerous for ships propulsion systems with coupled shaftlines, by means of large scale model testing and related numerical simulations.

In the present work, the extended experimental campaign results on a free running model of a twin-screw ship are presented, allowing to obtain a deeper insight of the problem. In particular, tests have been carried out simulating different simplified control schemes, starting from the most common constant rate of revolution tests and including different control strategies (constant torque and power). Usual standard maneuvers (turning circle, zigzag and spiral) have been carried out, providing results for asymmetrical shaft behavior and the more general ship maneuverability behavior. Results from the present analysis, together with the previously presented results, allow to obtain the complete model for the time domain simulation of asymmetrical shaft functioning. Moreover, they allow to provide information and guidelines about the most suitable model testing procedure for the analysis of this complex phenomenon.