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On the development of a ship simulation model for maneuvering tasks in waves

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The possibility of simulating the interaction of hull, propeller, and engine is gathering the interest of several researches in view of a more realistic design and control of the whole propulsion chain. The engine performance in rough seas is affected by the dynamics of the hull and consequently by the complex flow regime at the propeller, which induces fluctuating engine torques and revolutions.
In a previous research, the case study was limited to straight run simulations in irregular waves for a Ro-pax ferry, equipped with mechanical diesel propulsion. The numerical simulation model will be further developed for including the main engine behavior in waves, during maneuvering tasks. However, due to the limited data for the Ro-pax ferry considered so far, a comprehensive validation of maneuvering model currently seems not possible for this hull. Therefore, a well-known benchmark ship is introduced, i.e. the KVLCC2, for which several experimental test data are available in the technical literature. The focus on the numerical modeling for the KVLCC2 stays in the implementation of a comprehensive maneuvering model (i.e. including rudder propeller interactions), capable of simulating ship maneuvering in waves with a fair level of accuracy. Different approaches will be applied and compared. The comparisons between simulation and experimental data will disclose the range of applicability and the validity of the numerical models under investigation. Finally, the more appropriate approach for future applications concerning the overall assessment of the engine behavior in waves, will be selected.

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