

Optimisation of ship form based on seakeeping behaviour using Machine Learning

MARINE 2023

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ABSTRACT

The analysis of seakeeping behaviour is the study of the movements and forces produced by waves in marine systems. This is crucial in naval design, as important parameters such as the operability of the ship, passenger comfort, propulsion performance, manoeuvrability, or the operability of equipment and systems depend on it. Traditionally, it has been analysed by means of tests on hydrodynamic experience channels or with numerical models. In recent years, with the development of Artificial Intelligence, research works have been appeared in which the use of Machine Learning (ML) techniques have been proposed for the study of the seakeeping behaviour of ships [1,2]. In this work, a pre-trained Artificial Neural Network (ANN) [3] is used to predict seakeeping behaviour. Due to the speed up in predictions offered, a significant number of ships can be analysed with a reduced computation time, compared to traditional techniques.

The main objective is to search for the geometry best adapted to specific sea conditions and operational profiles, optimising specific metrics related to their operability. A ship hull form optimisation will be proposed, by the use of techniques such as Genetic Algorithms (GA) or Particle Swarm Optimization (PSO), linked to the surrogate ANN solver previously developed. Finally, the most relevant conclusions of the work will be shown.

REFERENCES

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