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## Hydrodynamic Assessment of Double-Ended Ferry for Operation in Venice

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The hydrodynamic assessment of double-ended ferries is always particularly challenging, not only due to their peculiar hull shape, but also because of the environment where they have to operate and its related constraints. The present paper discusses a practical case study of such hydrodynamic assessment for a double-ended ferry planned to operate in the Venice lagoon. The main objective of this study was to compare two propulsive configurations, with 2 or with 4 thrusters, both in terms of powering and manoeuvrability performances. Additional design requirements were good ship handling also in case of one propulsor failure and a limited drift angle. These requirements derive from the fact that the ship has to safely operate in the busy but narrow Venetian canals, sometimes even in presence of poor visibility due to fog.

The first step of the assessment was a hull optimisation by means of RANS calculations and taking into account the required adjustments in the hull between the two configurations. Successively, resistance and propulsion model tests highlighted the differences in powering performance between the two configurations. The tests also showed the optimal power distribution between fore and aft propulsion for both configurations.

The manoeuvring assessment also consisted in both experimental and numerical parts. First model tests were carried out for evaluating the low speed manoeuvrability of both configurations, including the case of one propulsor failure. Then the experimental results were used to tune a numerical model, which was used to perform a broader range of manoeuvres such as at high speeds or small helm angles.

In the end the results of this overall hydrodynamic assessment gave important indications on the performance of the ship and helped the definition of the optimal ship design.

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