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A simulation model for hybrid-electric inland waterway passenger vessels

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The increasing focus on air pollution reduction for transportation systems requires to adopt new technologies and innovative solutions to limit vehicles emissions. In case of inland waterway transportation (IWT), once vessels have to operate close to urban areas or in natural reserves, the necessity to provide a “green navigation” is of primary importance. With this specific aim, especially for small crafts, the adoption of an hybrid-electric power system grant a significant pollution reduction, leading also to a possible Zero Emission Mode (ZEM) navigation. However, the particular configuration of inland waterways makes the estimation of vessels’ hydrodynamic performances harder compared to a seagoing ship, because of restricted waters effects, affecting both resistance and manoeuvring characteristics. For this purpose, time domain simulation program has been developed to estimate the effective power demand of an inland vessel during a specific route. The program has been tested on the specific case of a passenger vessel designed for the Grado lagoon, where all the reference route bathymetric data were available. By means of the simulations it has been possible to state whether the vessel is suitable to operate in ZEM mode during the service.

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