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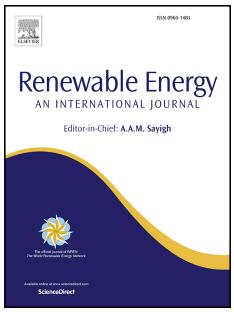

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Sizing and Rough Optimization of a Hybrid Renewable-based Farm in a Stand-Alone Marine Context☆

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Abstract

This paper deals with the sizing and rough optimization of a renewables-based farm devoted to energy production in a stand-alone marine context. The studied hybrid farm consists in combining wind turbines, tidal turbines, diesel generators, and pumped hydroelectric storage. The main sizing and optimization constraint is to achieve a compromise between the hybrid system overall cost, for a period of 15 years, and the CO_2 emission minimization.

The proposed sizing and optimization study is first based on the different available renewable sources, wind and tidal currents, characterization. This preliminary study is essential. Indeed, it will provide the renewables sources basic information in terms of wind and tidal speed potential for the hybrid farm components choice.

After presenting the hybrid farm different components, the simulation constraint is defined (energy conservation at the grid) in order to form a power exchange network at the grid level but in a stand-alone context. The optimization results are analyzed to explore wind turbines, tidal turbines, and the proposed pumped hydroelectric storage sizes on the targeted objectives.

Keywords: **Hybrid system, sizing, wind turbine, tidal turbine, diesel generator, pumped hydroelectric storage.**

Nomenclature

α_{axis} Tidal turbine axis direction (degree);

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