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Fluid dynamics optimization of a shaft-less rim-driven thruster

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The shaft-less rim-driven thruster (RDT) can provide many advantages over traditional ship propulsion plants including enhanced onboard comfort and propulsion efficiency, locations arrangement flexible installation, light weight and compact size. For this reason, during last years it become an attractive ship propulsion device in the marine industry.
Within the project P. E. R. Na. (Propulsore elettrico reversibile per la Nautica) financed by the FvG region with Uni-TS, Uni-UD and MW.FEP as partners, a hydrodynamic optimisation (DoE) was developed with the aim of determining the feasibility of this type of thrusters for propulsion of sailing boats.
The electric motor will have the possibility of generating electricity by extracting energy from the boat's motion when it sails. For this reason, from a hydrodynamic point of view, the best compromise has been reached between these two operation modes.
A completely parametric model of the rotor (blades and rim) has been created with Grasshopper inside the Rhinoceros 3D environment, a selection of variables has been included in the multi-objectives optimization process carried out through Mode Frontier (ESTECO) by measuring the parameters chosen by performing CFD simulations with the Star-CCM+ solver (SIEMENS).

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