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Marine Hydrokinetic Turbine Power-Take-Off Design for Optimal Performance and Low Impact on Cost-of-Energy

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ABSTRACT

Marine hydrokinetic devices are becoming a popular method for generating marine renewable energy worldwide. These devices generate electricity by converting the kinetic energy of moving water, wave motion or currents, into electrical energy through the use of a Power-Take-Off (PTO) system. Most PTO systems incorporate a mechanical or hydraulic drive train, power generator and electric control/conditioning system to deliver the generated electric power to the grid at the required state. Like wind turbine applications, the PTO system must be designed for high reliability, good efficiency, long service life with reasonable maintenance requirements, low cost and an appropriate mechanical design for anticipated applied steady and unsteady loads. The ultimate goal of a PTO design is high efficiency, low maintenance and cost with a low impact on the device Cost-of-Energy (CoE).