Collaboration on OPT Design for Generating Electrical Power from Ocean Waves

Cooperative Research and Development Final Report

CRADA Number: CRD-14-542

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In accordance with Requirements set forth in Article X, A(2) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

Parties to the Agreement: Ocean Power Technologies

CRADA Number: CRD-14-542

CRADA Title: Collaboration on OPT Design for Generating Electrical Power from Ocean Waves

Joint Work Statement Funding Table Showing DOE Commitment:

Estimated Costs	NREL Shared Resources
Year 1	$150,000.00
TOTALS	$150,000.00

Abstract of CRADA Work:

In the proposed project, Ocean Power Technologies Corporation (OPT) and the National Renewable Energy Laboratory (NREL) will collaboratively investigate the power output and loads associated with an asymmetric float previously investigated and designed by OPT, but will extend the analysis to include a compliant mooring.

Summary of Research Results:

Under the marine and hydrokinetic industry support project of Fiscal Year 2015, the National Renewable Energy Laboratory provided technical support to industry partner Ocean Power Technologies (OPT) in the capacity of design optimization. OPT is working to improve their PowerBuoy® point-absorber wave energy converter design to maximize performance while maintaining or improving manufacturability. To support OPT's design optimization objectives, NREL employed WEC-Sim (Wave Energy Converter Simulator), a dynamics simulator for wave energy converters developed by the National Renewable Energy Laboratory and Sandia National Laboratories, to simulate OPT's PowerBuoy performance. Prior to evaluating the design's performance, the WEC-Sim model was validated with experimental data provided by OPT, and viscous drag coefficients were acquired through computational fluid dynamics and existing data in the literature. WEC-Sim was then utilized to estimate the power performance and loads for design conditions, extreme conditions and directional waves. The various PowerBuoy float design configurations were then compared based on the simulated ratios of power/weight, power/load and power/area. The design optimization methodologies developed for this project and summarized in this report, as provided to OPT and the U.S. Department of Energy, are applicable to other wave energy converter devices and may be useful as a framework for future wave energy converter design development projects.

Subject Inventions Listing:

N/A

Report Date:

October 6, 2015

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