

NOVEL DESIGN AND ASSESSMENT METHODOLOGIES FOR WAVE ENERGY CONVERTER DESIGN

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As part of Task 8: *Novel Design and Assessment Methodologies for Wave Energy Converter Design* of the Advanced Laboratory and Field Arrays for Marine Energy and Lab Collaboration Project, this poster introduces an approach for designing wave energy converters (WECs) that can be implemented early during the conceptual design phase, enabling the ideation of higher performance WEC concepts. It also highlights the ways we will both employ and assess the Technology Performance Level (TPL) metric.

Currently, WEC concepts span a wide design space which includes a high number of functionally dissimilar devices [1]. Concept-agnostic assessment of WEC techno-economic performance using the TPL metric [2] allows for concepts to be assessed during the late stages of the design process; however, the assessment itself is not intended to be a design approach. It does not guide design engineers in concept generation and refinement. This leaves WEC designers with limited guidance in the early stages of the design process, often resulting in premature commitment to a single functional concept that can limit device performance. For this reason we propose a Set-Based Design (SBD) approach to WEC design which can enable the generation of high-performance concepts faster and with less expense. SBD is a design process in which engineers ideate a large set of potential solutions and work with critical stakeholders to ensure convergence on an optimal concept [3]. The concepts created through SBD will be evaluated by employing the TPL metric, and the metric will concurrently be assessed in its ability to identify high-performing concepts. Within SBD, we have also introduced practices for concept refinement and translation of stakeholder requirements into functional objectives. The work outlined in Task 8 and on this poster will enable an understanding of the relationship between early-design-phase design decisions and downstream performance, reducing costly iteration and improving prototype quality.

REFERENCES

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