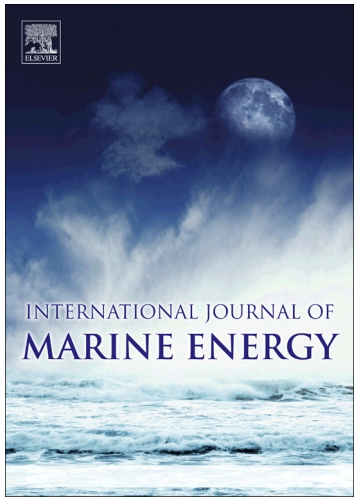

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A comparison of control strategies for wave energy converters

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Abstract

In this study, we employ a numerical model to compare the performance of a number of wave energy converter control strategies. The controllers selected for evaluation span a wide range in their requirements for implementation. Each control strategy is evaluated using a single numerical model with a set of sea states to represent a deployment site off the coast of Newport, OR. A number of metrics, ranging from power absorption to kinematics, are employed to provide a comparison of each control strategy's performance that accounts for both relative benefits and costs. The results show a wide range of performances from the different controllers and highlight the need for a holistic design approach which considers control design as a parallel component within the larger process WEC design.

Keywords: wave energy, control, dynamics

1. Introduction

The energy contained in ocean waves is distributed across a wide range of frequencies. In order to produce electricity efficiently, wave energy converters (WECs) must be designed to capture a large share of the energy from a broad range of ocean wave frequencies. Additionally, the majority of energy in ocean waves exists at relatively low frequencies, which are most easily accessed by relatively large WECs. To limit the size, and therefore cost, of a WEC and to increase energy absorption over a broad range of frequencies, an increasing body of research has shown power take-off (PTO) control to be an attractive path.

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