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Performance Evaluation of Wave Energy Converters

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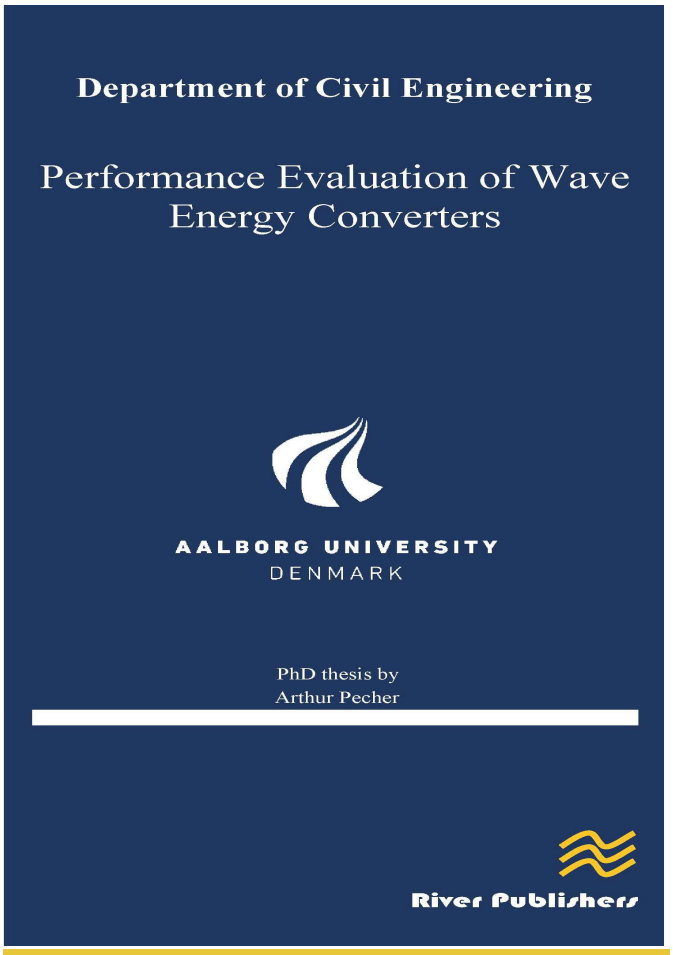
Ocean waves provide a sustainable, power-dense, predictable and widely available source of energy that could provide about 10 % of worlds energy needs. While research into waveenergy has been undertaken for decades, a significant increase in related activities has been seen in the recent years, with more than 150 concepts currently being developed worldwide. Wave energy conversion concepts can be of many kinds, as the energy in the waves can be absorbed in many different ways. However, each concept is expected to require a thorough development process, involving different phases and prototypes.

Guidelines for the development of wave energy converters recommend the use of different prototypes, having different sizes, which have to perform tank tests or sea trials. Thisimplicates the need of different testing environment, which shifts from being controllable to uncontrollable with the development stages, and results thereby in a need for specific testobjectives and procedures for each development stage.

This PhD thesis has looked into the different development stages and more specifically in the performance assessment of wave energy converters based on tank testing and sea trials. The objective was to enhance or complement existing standards and guidelines by making them more transparent, equitable and robust, in order to make power production estimation of full-scale commercial devices more accurate, more comparable between the different development stages and more coherent in between different concepts.



e-ISBN: 9788792982278
Available From: December 2012
Price:

KEYWORDS:
Keywords: Wave Energy Concerters, Guidelines, Power Production Estimation, Full-Scale

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