



Energies

an Open Access Journal by MDPI

CiteScore: 7.3

Impact Factor: 3.2

Special Issue Reprint

Optimal Control of Wind and Wave Energy Converters

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The Optimal Control of Wind and Wave Energy Converters entail employing advanced algorithms and methodologies to enhance energy capture while ensuring a consistent power output from turbines and wave energy systems. This process requires the modification of operational parameters such as blade pitch and generator speed in reaction to varying conditions, aiming to achieve maximum power point tracking, reduce mechanical stress, and enhance grid integration, particularly in complex offshore settings. The main aspects pursued refer to:

Maximizing energy capture: The goal of optimal control is to guarantee that the devices function at their maximum power point by dynamically modifying their physical or electrical attributes in real-time;

Reducing stress: Through the management of factors such as blade pitch and yaw, control systems alleviate mechanical loads and structural stress on the devices, thereby prolonging their operational lifespan;

Enhancing stability: Variations in wind and wave energy have the potential to disrupt the electrical grid. Implementing optimal control strategies can alleviate these power fluctuations, resulting in a more stable and dependable power supply.

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