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## **Wed-Mo-Po3.05-04 [31]: Experimental Verification and Analytical Prediction for Generating Characteristics of Double-Sided Permanent Magnet Linear Synchronous Generator for Ocean Wave Energy Converter**

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For permanent magnet (PM) linear generators to be applied to ocean wave energy converters, highly efficient energy conversion is important; however, for maximum power generation, wave motion variation must be treated in real time. Therefore, we propose a characteristic map of the generating performance, including characteristic results of power, losses, efficiency, force, and the power take-off (PTO) damping coefficient. The conditions for optimum performance and the range of maximum power generation can be obtained from these results. Furthermore, when regular wave energy is generated, the heaving motion of the buoy is changed by the PTO damping coefficient from the PM linear generator, and the input velocity of the PM linear generator is thereby affected. Therefore, selecting the condition for maximum power in regular wave energy is vital for ocean wave energy converters.

In this study, a three-dimensional (3D) analysis method and a manufacturing model are used for analysis of generating performance and experimental verification on a double-sided PM linear synchronous generator (PMLSG) with a slotless stator. The initial design was devised using the 3D analytical method, which reduced analysis time and provided increased reliability. In addition, no-load performance was verified through experiments on the manufactured model. And then, under an ac-load, we determined the generating characteristics of the PM linear generator, with the heaving motion of the buoy coupled with the generator according to ocean wave variation. Finally, we addressed the generating results of the PM linear generator for the ocean wave energy converter according to the irregular input wave. In the detailed manuscript, we present a simple summary process of the 3D analysis method and various experimental results of the manufactured model; and all the analytical procedures are specially designed to contribute to related research and industrial applications.

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