Contribution ID: **1147** Type: **Poster Presentation of 1h45m**

Research on a field-modulated tubular linear generator with quasi-Halbach magnetization for ocean wave energy conversion

Thursday 31 August 2017 13:45 (1h 45m)

With the energy crisis and environmental problems becoming increasingly prominent, the utilization of renewable energy is showing an accelerated attention. Compared with wind and solar power, ocean wave energy has many advantages such as high energy density, large amount and being easy to forecast. Direct-drive ocean waves energy conversion system(WEC) has a simple structure and higher efficiency, and this make it an effective way to extract energy from ocean waves. But the average speed of ocean wave is generally slow. This will lead the traditional linear generator with disadvantages of large weight and low power density. In order to solve this problem, the permanent-magnet field-modulated tubular linear generator is proposed, which can accelerate the speed of the traveling magnetic field by the teeth in the primary. Hence, it will lead it to higher power density and energy conversion efficiency. Simultaneously, equipped with quasi-Halbach magnetized permanent-magnet, it can improve the air gap magnetic density and reduce the volume and weight of the generator to some extent. In this paper, a proposed FMPMTLG with 10 pole-pairs and 9 primary teeth is investigated and designed. Meanwhile, a corresponding quasi-Halbach PMTLG is also designed to compared with the proposed machine. For the sake of fairness, these two machines are optimized with the same axial length, overall diameter, air-gap length and magnet volume. From the individual results of the FEA, it can be seen that the efficiency of the proposed machine is higher than the traditional PMTLG excluded the mechanical and stray loss. And due to the more pole-pairs, the cogging force of the FMPMTLG is lower than the traditional one. The proposed machine achieves lower voltage regulation for the weakened reactive effect. The tubular linear generator with quasi-Halbach magnetization has manufactured for the experimentation to verify the validity of the theoretical analysis.

Submitters Country

China

Author: XIA, Tao

Co-authors: Prof. YU, Haitao (School of Electrical Engineering, Southeast University); Dr GUO, Rong (School of Electrical Engineering, Southeast University); LIU, Xiaomei (Southeast University); HUANG, Lei (Southeat University)

Presenter: Dr GUO, Rong (School of Electrical Engineering, Southeast University)

Session Classification: Thu-Af-Po4.06

Track Classification: E3 - Wind, Wave, and Tidal Generators