

Experimental results and analysis of a 2-transmitter wireless power transfer system in seawater at midrange

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Abstract

Wireless power transfer (WPT) system in seawater exhibits distinct transmission characteristics from those in air due to the unique properties of seawater medium and the complexity of the seawater environment. In this paper, a 2-transmitter (2TX) and 1-receiver (1RX) WPT system in the frequency band of 350~550 kHz in seawater is observed. When the transfer distance is at midrange, the maximum load voltage point of the system is shifted from 460 kHz to 430 kHz compared to that in air, and the maximum transfer efficiency is 7 times of that in air. The system maintains a stable output voltage when the receiving coil is at different offsets. To grasp the influence mechanism of seawater on wireless power transfer, two new parameters, complex self-inductance and complex mutual inductance, are introduced into the circuit model to summarize the propagation of electromagnetic waves in attenuating medium, and the model is verified through experiments.

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