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耦合机构设计与优化

水下磁耦合式无线电能传输系统建模与分析

赵航[1], 张杰[1], 许知博[1], 贾静[1], 杨磊[2], 冯保祥[2]

作者信息 +

Modeling and Analysis of Underwater Magnetically-coupled Resonant Wireless Power Transfer System

ZHAO Hang[1], ZHANG Jie[1], XU Zhibo[1], JIA Jing[1], YANG Lei[2], FENG Baoxiang[2]

Author information +

History +

摘要 -

无线电能传输技术是解决水下设备续航问题的有效手段,但无线电能传输技术在水下应用时会受到海洋环境的影响。针对水下磁耦合式无线电能传输MCR-WPT(magnetically-coupled resonant wireless power transfer)系统,论述了磁耦合式无线电能传输系统的系统组成,建立了水下磁耦合式无线电能传输系统电路模型,并对海洋环境中产生的涡流损耗进行了定量分析。根据海洋环境分析了海水水流冲击对磁耦合式无线电能传输系统影响,并搭建实验平台进行验证。

Abstract

The wireless power transfer(WPT) technology is an effective means to solve the endurance problem of underwater equipment. However, it will be affected by the marine environment when applied underwater. In this paper, aimed at an underwater magnetically-coupled resonant wireless power transfer(MCR-WPT) system, the system composition of an MCR-WPT system is discussed, and a circuit model of the underwater MCR-WPT system is established. In addition, the eddy current loss generated under the marine environment is quantitatively analyzed, and the influence of seawater current impact on the MCR-WPT system is analyzed according to the marine environment. Finally, an experimental platform was set up for verification.

关键词

无线电能传输 / 磁耦合谐振 / 水下 / 海洋环境 / 涡流损耗

Key words

Wireless power transfer / magnetically-coupled resonant / underwater / marine environment / eddy current loss

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