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耦合机构设计与优化

基于正交DD线圈副边去耦合干扰的双负载无线电能传输系统

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Double-load Wireless Power Transfer System with Secondary-side Interference Decoupling Based on Orthogonal DD Coil

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摘要

在双负载无线电能传输系统中,副边线圈之间的耦合干扰问题成为制约系统性能的重要因素。为此,提出一种单发射-双接收磁耦合机构,旨在解决两个副边线圈之间的耦合干扰问题,并通过原边线圈的设计实现两个负载获得相同的能量输出。在不采用屏蔽材料和控制方法的情况下,该机构仅通过线圈结构设计即可实现两个副边线圈的完全解耦。实验结果表明,采用该机构的无线电能传输系统在双负载情况下,两负载互不影响且系统能量传输效率可达88.7%。

Abstract

In a double-load wireless power transfer(WPT) system, the problem of coupling interference between sec-ondary-side coils becomes a critical factor that seriously limits the system performance. To solve this problem, a single-transmitter dual-receiver magnetic coupling mechanism is proposed, which aims to solve the problem of coupling inter-ference between two secondary-side coils. In addition, the same power output for both loads is achieved through the de-sign of the primary-side coil. Without using shielding materials or control methods, this mechanism can achieve complete decoupling of two secondary-side coils only through the design of coil structure. Experimental results show that the ener-gy transfer efficiency of the WPT system with this mechanism can achieve 88.7% under double-load. Moreover, the two loads can operate independently with no interference.

关键词

无线充电 / DD线圈 / 双负载 / 线圈解耦 / 恒压输出

Key words

Wireless charging / DD coil / double-load / coil decoupled / constant-voltage output

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