16/06/2022

Dear Prof. Emil Levi

Editor-in-Chief of

IEEE Transaction on Industrial Electronics

We would like to submit the enclosed manuscript entitled “Carrier Phase Shift Method of SPWM for Concurrent Wired and Wireless Power Transfer Systems” which we wish to be considered for publication in IEEE Transaction on Industrial Electronics. The paper is an original piece of work and it has not been published in whole or in-part previously, and not under consideration for publication elsewhere.

Conventionally, power transfer to rotating systems is achieved using wireless power transfer-based contactless slip rings. These systems have two separate converters: one is for the motor drive, and the other is for the WPT system. In this study, it is proposed that the switching harmonics of the motor drive can be utilized to excite the WPT system while the low-frequency component still is used to drive the motor. Therefore, a cost-effective solution to the CSR system, which eliminates the WPT system's converter, is achieved. Special attention is given to independent control of motor and WPT output powers. A novel carrier phase-shift (CPS) method is proposed to independently control the inverter output voltages at the fundamental and the switching frequencies. The method is investigated analytically for sinusoidal-PWM (SPWM). With the development of wide-bandgap devices, the switching frequencies of the motor driver increased such that the same driver can excite practical WPT systems with acceptable sizes. Therefore, just an algorithm update would be enough to implement the proposed method for industrial motor drives. A conceptual study is performed where a 3-phase motor and a WPT system are driven using a GaN-based inverter. It is observed that experimental results are in good agreement with the theoretical calculations.

The paper is composed according to IEEE journal submission format. No conflict of interest exits in the submission of this manuscript, and manuscript is approved by all authors for publication.

I appreciate your consideration of our manuscript, and I look forward to receiving comments from the reviewers.

Kind regards,

Ozan Keysan