

16.02.2023

Dear Prof. Yaow-Ming Chen

Editor-in-Chief of

IEEE Transactions on Power Electronics

We would like to submit the enclosed manuscript entitled “Variable Carrier Phase Shift Method for Integrated Contactless Field Excitation System of Electrically Excited Synchronous Motors” which we wish to be considered for publication in IEEE Transactions on Power 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.

Recently, wireless power transfer (WPT) based contactless field excitation (CFE) systems have become more popular in order to excite the field winding of electrically excited synchronous motors (EESM). In such systems, while a converter of motor drive powers the phases of EESM, the WPT part of the CFE system is excited by a high-frequency converter. Therefore, two separate converters are required, increasing the system cost. In this study, it is proposed that the switching harmonics of the converter of the motor drive can be utilized to excite the WPT system while the low-frequency component still continues to drive the motor. Therefore, the WPT system's converter is eliminated, and a cost-reduced CFE system is achieved. However, particular attention should be given to independent and concurrent control of the EESM and the CFE system. Hence, a novel variable carrier phase shift method (VCPSM) is developed to achieve constant input excitation voltage for the WPT part independent of the motor operation. In addition, a hybrid frequency detuning control method is introduced to adjust the field current finely. In this way, just an algorithm update would be enough to achieve a CFE system without using an active converter. A conceptual study was performed via an experimental prototype, and it was achieved that experimental results were coherent with the theoretical calculations.

The paper is composed according to IEEE journal submission format. No conflict of interest exists 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