

19/08/2022

**Subject: Response to Major Revision of JESTPE-2022-03-0351.R1**

Dear Dr. Ron Hui

Thank you for your letter and the opportunity to revise our paper titled "Fault Tolerant Multi-Tx/Multi-Rx Inductive Power Transfer System with a Resonator Coil". The revisions offered by the reviewers have been helpful, and we also appreciate your insightful comments. The paper has been improved by the reviewers' comments. We have included the response to the reviewer's comments immediately after this letter. The modifications and additions are highlighted in the main text. We deeply appreciate your consideration of our manuscript.

Kind Regards

Dr. Ozan Keysan

**Reviewer 1:**

The comments have been well addressed, but I still have a simple question:

1. The Fig.6 shows the structure of the coil placements. The Fig.14 shows the experimental setup. It can easy to find the corresponding TX coils, MSR coil, but RX modules in Fig.14 are different from that in Fig.6. Why the HFCl can be used as RX modules? and how does the HFCl couple with MSR coil? The figure of the overall experiment setup should be presented.

- **Response:** Thank you for your comment, and sorry for the confusion. Section VII is expanded, including the motivation behind using the HFCl. Also, an electrical connection is shown in Fig. 14 to make clear the HFCl's connection and the experimental setup is now presented in Fig. 16.

**Reviewer 2:**

This paper proposed a multi-TX/multi-RX IPT system with middle-stage resonator for power-sharing, which increases reliability and fault tolerance. This paper has made certain contribution in slip-rings applications. However, there are still several questions:

- **Response:** Thank you for your constructive comments. We address your comments and make the required additions in the paper as given below.
1. For minimizing the cross-coupling, this paper has adopted measurements such as bending the end-windings, utilizing HFCl. The results should be specified and the detailed system configuration parameters including cross-coupling need to be listed.
    - **Response:** Thank you for the comments. The effect of bending the end windings on the cross-coupling is discussed in section VII. The cross-coupling between Tx modules in the prototype is measured and presented in Table-III. Details of the HFCl's are now presented in Section-VII and Section-VIII.
  2. The whole picture of the experimental set-up should be given, rather than the component diagrams (Fig. 14), which helps us understanding the coil structure.
    - **Response:** Thank you for your comment. The coil structure is now presented in Fig. 14, and an extra photo of the experimental setup is presented in Fig. 16.
  3. In section II, the prototype is designed for large synchronous generator'(SG) field excitation. This metal environment is challenging for IPT systems. How to apply the proposed system to this application? And how is the environment influence?
    - **Response:** Thank you for the comments. Your concerns on these issues are valid. The issues such as induced eddy currents on the machine frame, mechanical shaft and effect of fringing flux are now discussed in Section VII. FEA simulations to show the induced eddy currents on the mechanical shaft are now presented in Fig. 15.

### Reviewer 3:

Please, find a better alternative for the term "contactless slip ring" as "slip ring" is already considered and defined as a mechanical system through which the static part touches the moving part.

- **Response:** Sorry for the confusion. The term is replaced with "contactless energy transfer system".

The paragraph added in Section IX mainly discusses the merits of the given approach. Please, provide more explanations on the criteria and figures in Table VI (for example, it can be explained the pros and cons of each technique for the given criteria). It is good to make the reader's mind ready for the merits of the work before jumping to a conclusion.

- **Response:** Thank you for your comments. Table-VI is now included to present the advantages and disadvantages of the proposed system. Section IX is expanded to discuss these issues.

The lower current rating in the proposed modular structure can also be achieved in a simple Tx-Rx design without resonators. Please, provide a more acceptable justification for the system reliability.

- **Response:** Thank you for your comments. Yes, a simple Tx-Rx structure can be used, but without resonator coils, unbalanced power distribution exists due to the coupling differences. The advantages and disadvantages of the proposed system are now discussed in Section IX.

Section VI-D: Regarding the inductance fluctuations, it is good to provide some experimental images showing the presence and percentage of these fluctuations.

- **Response:** Thank you for your comments. The experimental results for mutual inductance fluctuation is now presented in Fig. 17, and the results are discussed in Section VIII.