日本学術振興会に紙媒体で提出する必要はありません。

様　式　Ｆ－７－１

科学研究費助成事業（学術研究助成基金助成金）実施状況報告書（研究実施状況報告書）（令和２年度）

		機関番号	１４６０３
所属研究機関名称		奈良先端科学技術大学院大学	
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１．研究種目名　若手研究　　２．課題番号　20K14736

３．研究課題名　Load-Independent Output Design and Isolation Method for Multiple-Input Multiple-Output Inductive Power Transfer

４．補助事業期間　令和２年度～令和３年度

５．研究実績の概要

In WP1, under the ideal condition of lossless transmission, we have successfully derived a compensation circuit for 2x2 IPT system (IPT system with two transmitters and two receivers). This solution can be implemented only in the receiver-side.

In WP2, we have evaluated the performance of the preliminary solution of WP1 under lossy transmission. We have found that by moving a part of the compensation circuit to the transmitter-side, the impact of lossy elements can be significantly reduced. We have already presented the results of WPs 1 and 2 in two international conferences.

In WP3, we have successfully refined the solution so that it can be applied when partial knowledge on the system parameters is known to each of the transmitter-side and the receiver-side. These results have been reported in the conferences [2], [4]-[8]. All the solutions mentioned above were developed for IPT system using single frequency. We have also developed a modified version of the solution for IPT using two adjacent frequencies and have reported in the conferences [1] and [3].

６．キーワード

inductive power transfer　mimo　cross-talk　isolation

７．現在までの進捗状況

区分　（2）おおむね順調に進展している。

理由

So far, the reported results in WPs 1, 2, 3 are applicable to only a special case of IPT system with two transmitters and two receivers. However, we have theoretically derived the solution for a more general IPT system with M transmitters and N receivers based on these preliminary solutions. Even though the effectiveness of this general solution has not been verified by computer simulation or experiments, it is safe to say that almost all the research purposes of WPs 1, 2, 3 have been achieved in this FY. This research is progressing as planned.

８．今後の研究の推進方策

To develop the outcomes of WPs 1,2,3, we are currently evaluating the general solution for compensation circuit of IPT system with M transmitters and N receivers via extensive computer simulations and experiments. We plan to summarized the results and submit a journal paper for review.

Meanwhile, we will carry out WPs 4 and 5 as scheduled. In WP4, we will evaluate the transferable power improvement effect of MIMO-IPT with the proposed compensation design. In WP5, we will investigate if we can achieve magnetic leakage reduction with MIMO-IPT as a side effect of the proposed compensation design.

９．次年度使用が生じた理由と使用計画

The first reason is that the travel expense budget (600,000 JPY) could not be executed due to the covid 19 pandemic. We plan to use this budget for personnel expenditure to enhance the research outcome next FY.
The second reason is that we have changed the plan to purchase some articles for experiments (about 300,000 JYP) to the next FY due to delay in delivery time during the pandemic.
The third reason is that the budget for miscellaneous expenses (mostly journal submission fee) were not executed. Currently, we are preparing the journal papers and plan to use this budget next FY.

１０．研究発表（令和２年度の研究成果）

〔雑誌論文〕　計0件

〔学会発表〕　計8件（うち招待講演　0件／うち国際学会　7件）

１．発表者名
Q. T. Vo, Q. T. Duong, M. Okada

２．発表標題
Cross-Talk Mitigation Using Band-Stop Filters for Multiple-Frequency One-To-Multiple Inductive Power Transfer

３．学会等名
The 15th European Conference on Antennas and Propagation（国際学会）

４．発表年
2021年

１．発表者名
Y. Sakamaki, Q. T. Duong, M. Okada

２．発表標題
Experimental evaluation of series resonance scheme for 2x2 MIMO IPT

３．学会等名
2020 International Symposium on Antennas and Propagation（国際学会）

４．発表年
2021年

1．発表者名
Q. T. Vo, Q. T. Duong, M. Okada

2．発表標題
Two-frequency One-to-Two Inductive Power Transfer System with Load-independent Output Voltages

3．学会等名
2020 Asian Wireless Power Transfer Workshop（国際学会）

4．発表年
2020年

1．発表者名
Y. Sakamaki, Q. T. Duong, M. Okada

2．発表標題
Investigation on Impact of Phase Difference on Series Resonant 2×2 MIMO IPT System

3．学会等名
2020 Asian Wireless Power Transfer Workshop（国際学会）

4．発表年
2020年

1．発表者名
Q. T. Vo, Q. T. Duong, M. Okada

2．発表標題
Efficiency Comparison of Cooperative Inductive Power Transfer Systems

3．学会等名
2020 International Conference on Advanced Technologies for Communications（国際学会）

4．発表年
2020年

1．発表者名
T. Ohashi, Q. T. Duong, M. Okada

2．発表標題
Evaluation of Inductive Power Transfer System for Mobile Using Receiver-Side Compensation Circuit

3．学会等名
International Symposium on Medical Information Communication Technology（国際学会）

4．発表年
2020年

1．発表者名 S. Isogai, Q. T. Duong, M. Okada
2．発表標題 A Flexible Design of Secondary-Side Compensation Circuit for Inductive Power Transfer
3．学会等名 International Symposium on Medical Information Communication Technology（国際学会）
4．発表年 2020年

1．発表者名 酒巻有吾，ズオンクアンタン，岡田実
2．発表標題 2×2磁界結合型ワイヤレス給電システムのための直列共振回路に関する一検討
3．学会等名 電子情報通信学会無線電力伝送研究会
4．発表年 2020年

〔図書〕　計0件

１１．研究成果による産業財産権の出願・取得状況

計0件（うち出願0件／うち取得0件）

１２．科研費を使用して開催した国際研究集会

計0件

１３．本研究に関連して実施した国際共同研究の実施状況

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１４．備考

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