GENERALIZED CIRCUIT MODEL FOR SHIELDED CAPACITIVE WIRELESS POWER TRANSFER

スジアナ, ビンティ, アハマド

出版情報：Kyushu University, 2021, 博士（工学）, 課程博士
バージョン：

ABSTRACT

Wireless power transfer is the technology to transfer the power without wire. The wireless power transfer technology can be divided into three which are inductive power transfer (IPT), capacitive power transfer (CPT) and hybrid power transfer. This work proposes the shielded capacitive power transfer (CPT) using four coupling plates and two shielding plates. The capacitive power transfer using the electric field resonant to transfer power between the coupling plates. The work introduces the generalized circuit model of the S-CPT for wireless power transfer in which the circuit can be formed into the symmetric and asymmetric configuration. The work purposes to analyze the shielded capacitive power transfer circuit in resonance, matching impedance, voltage breakdown, and efficiency. Second, the work aims to develop S-CPT system in both symmetric and symmetric configuration using experimental set-up. The recommendation on the generalized circuit regarding to the behaviour of the circuit is included as the aim. The S-CPT system is connected to Class E Power amplifier, DC supply and the load. In analysis part and experimental part, 6.78 MHz and 13.56 MHz are used as an operating frequency. The work uses Matlab, LTSpice and MS Excel as the major simulation tools for analysis part. The analysis result shows generalized circuit can be used in designing the S-CPT circuit regarding the stability, lightweight and less loss application. Moreover, the generalized circuit is flexible in which can be used with different operating frequency and different range of the designated power. The results show the good agreement between the experimental and analysis in the generalized circuit.