

EXPERIMENTAL STUDY OF ELECTROMAGNETIC INTERFERENCE (EMI) ON PCBs AND CABLES ENCLOSED IN COMPLEX STRUCTURES

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EM coupling on cables and circuits is an important problem in EMI/EMC. However, complex surrounding structures and countless geometrical configurations of cables and PCBs makes it challenging for conventional EM solvers to evaluate induced voltages on circuits and cables in the system. Recently, new hybrid numerical and semi-analytical methods were proposed for the EMC/EMI analysis of complex shielding enclosures. These include, EM coupling onto cable bundles [Bayram and Volakis, *IEEE Trans. EMC*, Vol. 47, Issue 2, May 2005 pp 234-246], EMI effects on PCB traces [Bayram and Volakis, *2005 IEEE AP-S Int. Symp.*], and coupling of penetrating wires to shielding enclosures [Lertsirimit et al, *2004 IEEE Symp. Ant Prop.*, Vol. 1, pp 375-378]. All these methods concentrated on solving the individual pieces/components, whereas it is desirable to investigate EMI/EMC coupling at system level. As we aspire to coming at system level analysis, it is important to generate reference data based on measurements for future validation.

This work presents an experimental study of EMI/EMC effects on cables and printed circuit boards enclosed within a complex structure comprising several cavities. To this end, a multi-cavity structure was constructed, with several measurement ports to evaluate EMI coupling for various enclosure configurations. The measurement setup employs multiple rectangular and cylindrical cavities, penetrating wires and analog/digital circuits. This complex structure will be illuminated by a plane wave and the induced fields and load voltages will be measured within 1-3 GHz band. Shielding degradation due to penetrating wires and apertures connecting adjacent structures will also be considered. The measurement data will be validated using conventional solvers and will be used as a reference for validation of the aforementioned semi-analytical and numerical methods.

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