DESIGN AND FABRICATION OF TRANVERSE ELECTROMAGNETIC (TEM) CELL

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ABSTRACT

Transverse electromagnetic (TEM) Cell generates accurate electromagnetic waves from 0 Hz to several MHz Using this device, Electromagnetic Interference/ Electromagnetic Compatibility (EMI/EMC) tests of small RF devices can be performed in regular laboratory environment. Before invention of TEM Cell, anechoic chamber environment is needed to perform EMI/EMC tests. However, this way is too costly and restricted and using TEM Cell, it is much cheaper and less time consuming. During this project, TEM Cell is designed, modelled, fabricated and tested.

Nowadays, it is widely used during EMI/EMC tests of small RF devices and radiofrequency radiation tests of biological samples. TEM Cell can be designed as open or closed model. One of the closed models can be used to test larger units or objects and it is called Gigahertz Transverse Electromagnetic (GTEM) Cell. GTEM Cells have absorbers inside the chamber and it is not only composed of metal. If the object is large to fit into TEM Cell or GTEM Cell, anechoic chamber is needed to accomplish EMI/EMC tests. Because of TEM Cell's advantages (quasi-uniform electric field inside the cell, cost and easy to simulate, design and build), it started to get attention and EMI/EMC companies started to sell these devices.

In this project, it is preferred to fabricate open model since closed model doesn't have any advantages when simulation results are compared and open model is also cheaper than closed model. It is seen that either copper sheet or aluminium sheet is used as a base material. Aluminium is used as a metal type in this work since it is easy to work on. The purpose of this project is to teach students to use an electromagnetic simulation program, to learn the design process of a device and to measure return loss (S11).

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