Shielded Anechoic Chamber

DA 325, Department of Electrical Engineering, Indian Institute of Technology Kanpur

A Radio frequency (RF) anechoic chamber is a closed RF echo free space that simulates infinite free space condition inside a room. It is constructed by covering the inner walls of the room by RF absorbers made of carbon impregnated foam shaped in the form of pyramids (Fig. 1). The size of the pyramids and the carbon composition determines the lowest frequency that can be effectively absorbed. Larger sized cones are capable of absorbing lower frequency waves.

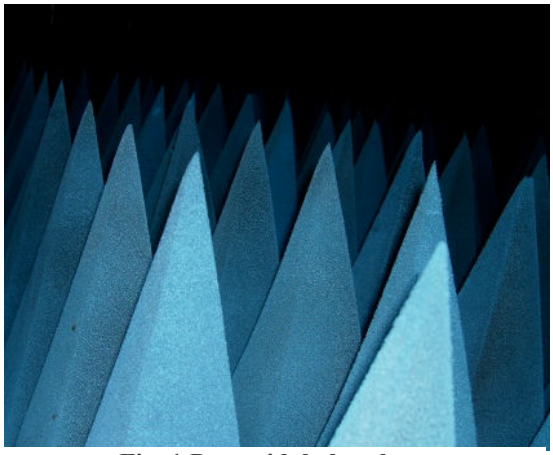

Fig. 1 Pyramidal absorbers

Anechoic chambers are used for the measurement of antenna radiation pattern, electromagnetic compatibility, radar cross section, etc. Apart from creating a reflection free environment, an anechoic chamber should also suppress the unwanted signals penetrating into the chamber and interfering with the measurements. This is achieved by first lining the walls of the chamber by high permeability metal sheets and then with the RF absorber material. The metal cage is grounded using a specially prepared low conductivity earth pit connection to provide a zero potential cage. The metal cage shields the measurement space from external interferences.

A shielded anechoic chamber is being constructed at the Department of Electrical Engineering (room # DA 325), IIT Kanpur, with funding from the CARE scheme. The chamber dimensions are 7 m × 6 m × 3.3 m (L×W×H). It can be used for conducting measurements at frequencies from 1 GHz to 26 GHz. The quiet zone is 2 m × 0.8 m × 0.8 m (W×H×L) at 1 GHz, and 2 m × 0.3 m × 0.3 m (W×H×L) between 10 GHz and 26 GHz, centered at a distance of about 4 m from the transmitting antenna. The shielding effectiveness is -50 dB at 1 GHz and -40 dB from 2 to 18 GHz.

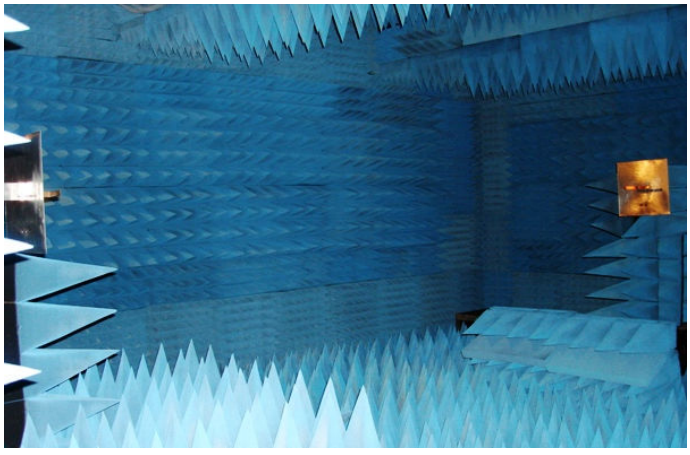

Fig. 2 A view of the anechoic chamber with the antennas

The construction of the anechoic chamber is almost complete. A view of the anechoic chamber with a pair of antennas is shown in Fig. 2. Performance validation of the chamber is in progress. It is expected that the chamber will be ready for use soon.

Contacts:

Dr. A.R. Harish (email: arh@iitk.ac.in)
Prof. M. Sachidananda (email: sachi@iitk.ac.in)
Department of Electrical Engineering, IIT Kanpur