

Canonical Target Response in a Reverberation Chamber

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A baseline characterization of the reverberation chamber at the US Army Research Laboratory (ARL) has been previously conducted (A. Klinkowski, Army Research Laboratory, ARL-SR-0346, 2015). The reverberation chamber is constructed of brazen aluminum and brass with dimensions A x B x D as (1.75 x 4.25 x 2.55) m as shown in Figure 1. A multi-moded chamber allows for random polarization from every angle in a roughly uniform isotropic environment near the center of the chamber. The coupling to a particular device can be measured in the reverberation chamber but it often cannot be suitably instrumented without changing the response. Of interest is the correlation of measurements in the reverberation chamber to the same device inside another facility, such as a gigahertz transverse electromagnetic (GTEM) cell or anechoic chamber. To this end a simple canonical target is chosen as a wire centered along the length of a metal box with and without a slotted top where the slot is oriented perpendicular to the wire. One end of the wire is terminated into a 50 Ω load with the induced signal measured by a power meter at the other end. The idealized box model can produce accurate results for the wire input reflection coefficient as shown in Figure 2. The numerical results are not exact since they correspond to a single incident plane wave and do not include the effects versus frequency of the box located in the reverberation chamber excited by a Vivaldi monopole. But it should be useful for modeling the various experiments that can be conducted in the reverberation chamber since the dominant coupling to the wire is when the electric field is perpendicular to the slot. In this manner some expectation of the measured results can be obtained through simulation. In addition a numerical model can be useful to estimate dynamic range and provide additional insight into the utility and limitations of experiments conducted in the reverberation chamber compared to other facilities.

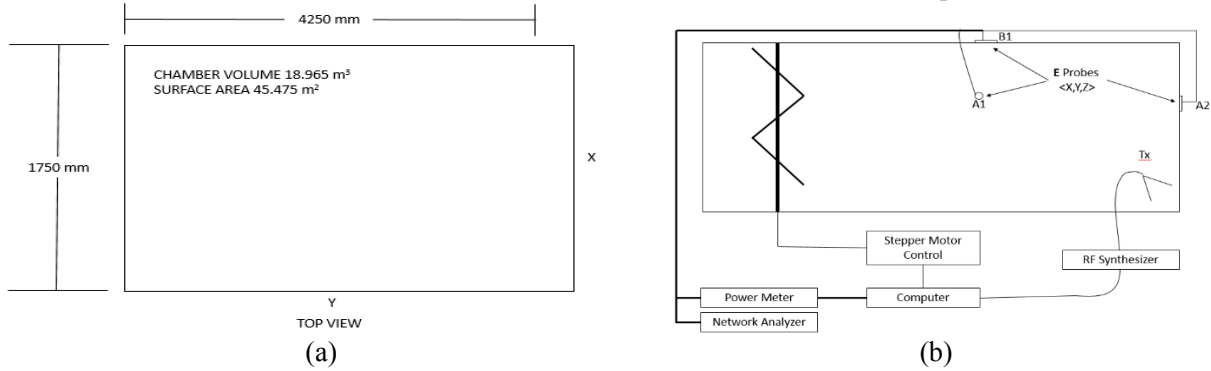


Figure 1. Reverberation chamber (a) top view and (b) side view.

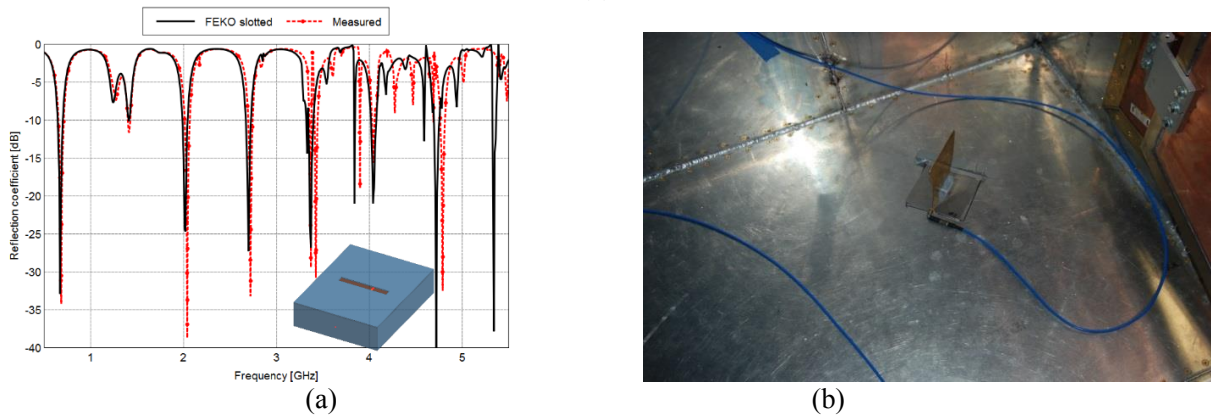


Figure 2. Canonical target (a) CAD model and (b) Vivaldi monopole transmitter.