Determination of Measurement Uncertainty of Different Reverberation Chambers

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The reverberation chamber (RC) is basically a metal cavity with many excited modes which are stirred to create a statistical isotropic field environment with Rayleigh distributed fields [1]. RC has been used to measure antenna radiation efficiency, diversity gains and MIMO capacity [2]. For all the applications, the measurement accuracies of the RCs are important to know. We thereby propose a method of characterizing the uncertainty of the RC in terms of error standard deviation (STD). We use vector network analyser (VNA) to measure the RC power transfer function [3]

$$G_{ch} = \frac{e_{rad1} e_{rad2} c_0^3}{16\pi^2 V f^2 \Delta f} \tag{1}$$

where e_{rad1} and e_{rad2} are the radiation efficiencies of the transmitting and receiving (reference) antennas in RC respectively, V is the RC volume, and c_0 is the speed of light. For a particular RC, the RC power transfer functions are measurement nine times with nine configurations (reference antenna is placed to three heights and at each height it is oriented as horizontal, vertical and 45 degree) to get nine almost independent measurements. A STD is calculated finally based on the nine G_{ch} at each frequency. A smaller STD means a better accuracy. Measurements have been done at Bluetest HP RC, Sony-Ericsson RC and SP RC. For brevity, only STD curves for Bluetest RC are shown here. In the full paper, we will analyse the results for different RCs. The measured STD curves will also be compared with a theoretical uncertainty (STD) model.

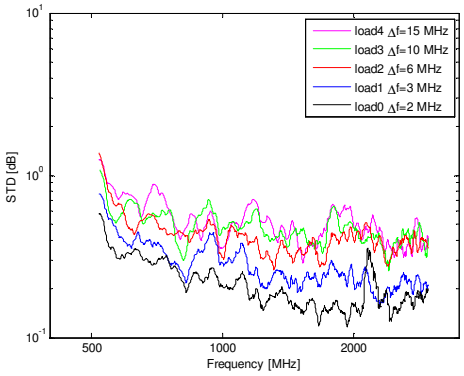

Fig. 1 STD curves for Bluetest HP RC. Load0—load4 represent increasing lossy RC loading.

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