Backscatter Coefficient Measurements for Reverberation Chamber Characterization

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Reverberation Chambers (RCs) are a unique and important environment for performing electromagnetic compatibility and other measurements. It has been proposed that a measurement analogous to that of the enhanced backscatter in random media be used as a metric for characterization of RCs. In *Electromagnetic Fields in Cavities*, (David A. Hill, Wiley-IEEE Press, 2009, pp 91-148) ray optics is used to show that this backscatter coefficient, k_b, should be 2 if the environment is ideally randomized. Measurements have been made in a RC at NIST that confirms k_b is near 2 when the RCs modal structure is stirred well enough. The NIST RC uses large aluminum paddles that rotate in order to stir the modes of the chamber. In trying to determine what "well enough" means in these k_b measurements, it was found that if high gain antennas are focused on the paddles the k_b measurement no longer results in 2. Rather, it increases in proportion to the amount of radiated power that is directed toward the paddle versus what is radiated into all 4π steradians over the antenna. This means that the measurement of k_b is based on position and pointing direction of the antenna and without some form of correction is not useful in characterizing the randomness of the reverberant environment. Current effort is being made to model and measure the effect of the paddle on the antenna to determine if a correction factor can be used to fix this offset in the backscatter coefficient. In this presentation, we will report on our current findings.