**Quality Factor and Absorption Bandwidth of Small Receiving Antennas and Absorbers**

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The theory dealing with the radiation quality factor ($Q_{\mathrm{rad}}$) and its minimum value for a transmitting antenna enclosed within a sphere of a given radius (Chu sphere) is well established. It is also known that if the antenna is small and tuned to a single resonance, there is an inverse relationship between $Q_{\mathrm{rad}}$ and the matching bandwidth ($B_{\mathrm{match}}$) of the antenna. The ability to learn about the frequency behavior of the antenna based on the knowledge of $Q_{\mathrm{rad}}$, a quantity evaluated based on the fields at the resonance frequency only, is clearly appealing. In this work, we develop a complementary theory for small receiving antennas and absorbers. First, we define a new quality factor ($Q_{\mathrm{abs}}$), characterizing absorption by resonant structures such as conjugate-matched receiving antennas and lossy objects tuned for maximum absorption. In analogy to $Q_{\mathrm{rad}}$ , defined as the ratio of the stored energies in transmitting mode to the radiated power, $Q_{\mathrm{abs}}$ is defined as the ratio of the stored energies associated with the scattered fields to the power absorbed by the structure. Next, we show that for small receiving antennas the absorption bandwidth ($B_{\mathrm{abs}}$) is inversely proportional to $Q_{\mathrm{abs}}$ .Then, we extend the scope of the $Q_{\mathrm{abs}}$-$B_{\mathrm{abs}}$ relation to the case of small absorbers. Finally, we show that one can define an absorber resonance condition that is consistent with the known resonance condition of antennas. Specifically, we show that when a small absorber is tuned for maximum absorption, the magnetic and electric stored energies throughout the entire space (both inside and outside the absorber), are nearly equal. Numerical examples for various types of receiving antennas and absorbers are given and the $Q_{\mathrm{abs}}$-$B_{\mathrm{abs}}$ relation is rigorously validated by fully carrying out the volume integrals required for the calculation of the stored energies. Clearly, in this case also, the ability to predict the absorption bandwidth of receiving antennas and absorbers, based on the fields at the resonance frequency only, is appealing.