Abstracts

Electromagnetic Resonances and Q-Factors of Lossy Dielectric Spheres

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A theoretical and experimental study of the electromagnetic resonances of spheres is presented. In particular, the scattering characteristics of spheres inside rectangular waveguides are investigated at and around the resonant frequencies. The approach is based on the scattering theory developed by Mie in 1908. Mie's theory is valid for scattering of a plane electromagnetic wave by a homogeneous and isotropic sphere of arbitrary diameter. It encompasses both lossless and lossy spheres. Three continuous functions of frequency are presented. They contain information on the resonant frequencies, the Q-factors, and the output power losses of the sphere. The effect of losses on the resonant behavior was also studied. The theoretical results were compared to experimental data. The agreement between theory and experiment is excellent. An experimental study of the effect of inhomogenities and irregularities of the sphere's material and shape was also made.

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