Abstracts

Unloaded Q's of Axially Asymmetric Modes of Dielect of Resonators

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Resonant frequencies and unloaded Q's of hybrid modes on cylindrical, dielectric resonators in conducting enclosures are studied. The formulation uses the mode matching technique, and includes axially symmetric (TE/sub 0m/ and/or TM/sub 0m/), as well as axially non-symmetric hybrid (HE/sub nm/) modes which could exist in dielectric loaded waveguides. The structures analyzed can simulate resonators on microstrip substrates. The losses in both the conducting walls and the dielectric material, and stored energy in the general resonator are obtained. Mode amplitudes determined from the solution of the boundary value problem by mode matching, are used to rigorously compute the unloaded Q's of the resonators. Numerical results in the millimeter wave range are presented for the unloaded Q's of various modes, as a function of the resonator parameters. From these results effect of losses on the resonator wall are discussed, and methods of improving the unloaded Q's are explored. Experimental results are presented which verify the accuracy of the model used and the numerical computations.

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