Abstracts

A Dual-Mode Beam Waveguide Resonator and Frequency Stabilizer at Millimeter-Wave Frequencies

J.W. Mink and E.H. Scheibe. "A Dual-Mode Beam Waveguide Resonator and Frequency Stabilizer at Millimeter-Wave Frequencies." 1966 Transactions on Microwave Theory and Techniques 14.5 (May 1966 [T-MTT]): 222-228.

By applying perturbation theory to one of the higher modes that may exist in the beam waveguide resonator (also known as the focused Fabry-Perot interferometer), it can be shown that the degeneracy of the mode system can be reduced, resulting in two mode systems with slightly different resonant frequencies. Using this result, a dual-mode frequency discriminator was constructed and used as a reference element for stabilizing the frequency of microwave sources. The stability of a 34-GHz stabilized source was better than 1 part in 5X10/sup 7/ short term and better than 1 Part in 1.5X10/sup 6/ long term. The frequency sensitivity of this dual-mode resonator to changes in the properties of the dielectric medium between the end plates was utilized to determine the dielectric constant of gases at 34 GHz with an accuracy of a few parts in 10/sup 7/.

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