Abstracts

Intrinsic Modes of Radiation in Ferrite Patch Antennas

H. How, T.-M. Fang and C. Vittoria. "Intrinsic Modes of Radiation in Ferrite Patch Antennas." 1994 Transactions on Microwave Theory and Techniques 42.6 (Jun. 1994 [T-MTT]): 988-994.

We have found two types of radiation modes for patch antennas loaded with ferrite materials. Each mode of radiation is a linear combination of normal modes of propagation in parallel plate waveguide separated by a slab of ferrite material. We have introduced new boundary conditions in which only TE modes of oscillation in the patch antenna cavity result. According to different propagation directions relative to the applied dc field these TE modes are distinguished as transverse modes and longitudinal modes, and they possess mutually perpendicular radiation polarizations. While the longitudinal TE modes are found to form discrete modes in the frequency domain, the radiation frequency of a transverse TE mode can be continuously tuned over a wide frequency range by varying the biasing magnetic field. Circularly polarized radiations may result from simultaneous excitations of these two modes. Ferrite patch antennas of square geometry have been fabricated and tested. The measured resonant frequencies compared very well with our theory.

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