Abstracts

The Radiation of Electromagnetic Power by Microstrip Configurations

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A new technique for calculating the radiation losses of microstrip configurations is presented. The method applies if the wavelength is large compared to the width of the conducting strip and the thickness of the dielectric wafer. It is shown that the radiated power, which is partly carried by "space waves" and partly by "surface waves," can be computed in terms of the specific inductance and the specific capacitance of the transmission line, without making any assumptions regarding the current distribution in the microstrip. It appears that the fraction of the radiated power carried by surface waves contains the frequency to a higher power than does the fraction carried by space waves and is therefore relatively small. The investigated configurations are the infinitely long transmission line excited by a voltage-slit, the half-wavelength straight resonator, the full-wavelength circular resonator, and the quarter-wavelength hair-pin resonator. It follows that the quality factor of the straight resonator and the circular resonator are inversely proportional to the square of the frequency, whereas the quality factor of the hairpin resonator is inversely proportional to the fourth power of the frequency.

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