Abstracts

A Vibrating-Dipole Technique for Measuring Millimeter-Wave Fields in Free Space

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EM field measuring techniques, based on the modulated-scattering principle, are well established at microwave frequencies. The main difficulty in extending measurements to the millimeter-wave region is that of scaling the scatterer for operation at these wavelengths. The technique of modulated scattering described in this paper overcomes this limitation. A thin metallic dipole, attached to a vibrating nylon cord, forms the modulated scatterer which interacts with the electric field and gives rise to a phase-modulated reflected wave. The reflected wave is then combined with preference wave in a coherent detection system. The detected signal contains information about the amplitude and phase of the field at the midpoint of the dipole's vibration. An analysis of the technique is presented and the factors affecting the accuracy of measurement are fully discussed. It is shown how the measurement errors can be minimized. Amplitude and phase measurements, taken at a wavelength of 4.8 mm, verify the validity and accuracy of the technique.

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