Abstract

Various studies of diffraction of electromagnetic waves motivated by and applied to work on microwave aperture antennas are reviewed in relation to their significance to the study of optics. A critique of the Kirchhoff formula is presented to show the essentially heuristic nature of the formula and its range of applicability. Other approaches to high-frequency approximations for diffraction problems are indicated together with various experimental results showing the structure of the electromagnetic field in the neighborhood of the aperture or scatterer. The results illustrate how studies in the microwave region have enlarged the scope of optics and provide a rich body of material for teaching the subject of diffraction in physical optics.

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Concepts and Techniques of Microwave Optics
Réal Tremblay and Albéric Boivin
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In electromagnetics and antenna theory, antenna aperture, effective area, or receiving cross section, is a measure of how effective an antenna is at receiving the power of electromagnetic radiation (such as radio waves). The aperture is defined as the area, oriented perpendicular to the direction of an incoming electromagnetic wave, which would intercept the same amount of power from that wave as is produced by the antenna receiving it. At any point. Aperture illumination and antenna patterns. Microwave transmission lines. Microwave dipole antennas and feeds. Linear array antennas and feeds. Waveguide and horn feeds. It follows from elementary diffraction theory that if $D$ is the maximum dimension of an antenna in a given plane and $k$ is the wavelength of the radiation, then the minimum angle within which the radiation can be concentrated in that plane is 

$$1$$

With directive antennas such as have no parallel in long-wave practice; if agivendirectivity.