Abstracts

Transmission through a Conducting Screen Perforated Periodically with Apertures

C.-C. Chen. "Transmission through a Conducting Screen Perforated Periodically with Apertures." 1970 Transactions on Microwave Theory and Techniques 18.9 (Sep. 1970 [T-MTT]): 627-632.

A general solution to the problem of determining first the aperture field distribution and then the transmission and reflection coefficients of an infinite planar conducting sheet perforated periodically with apertures has been formulated. The excitation is considered to be a plane wave incident at any arbitrary angle. The aperture dimensions and array element spacings were assumed to be comparable with the wavelength of the incident electromagnetic field. The solution given can include the effect of a dielectric slab used to support the thin conducting sheet. The solution is obtained by matching the tangential field components at the surface of the screen. The resulting integral equation is solved by the method of moments which reduces the integral equation to a system of linear algebraic equations that can be solved with the use of a digital computer. Accurate results for both the magnitude and phase of the aperture field distribution and the transmission coefficients for the propagating modes are determined explicitly for a specific example of slots arranged in an equilateral triangular lattice. The balance of power flow between the reflected and the transmitted waves has been checked with satisfactory results. The solution can be applied to the problem of scattering from a conducting screen with periodic apertures and to the complementary problem of scattering from a set of conducting plates by the use of Babinet's principle.

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