Abstracts

Electric Polarizability and Magnetic Susceptibility of Small Holes in a Thin Screen

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Frequently in the generation and transmission of RF waves, different regions of excitation are coupled by a small aperture in a common plane wall. When the dimensions of the aperture are small compared to the wavelength, the effect of the aperture can be described by an electric polarizability, chi, and magnetic susceptibilities psi/sub xx/ and psi/sub yy/, which are defined in static terms. Specific results for chi, psi/sub xx/, and psi/sub yy/ have been derived by Bethe and Collin for circular and elliptical holes. We have derived integral equations for the field components in the plane of the hole and variational forms for chi, psi/sub xx/, and psi/sub yy, in terms of these field components. We have also shown that the polarizability and (diagonalized) susceptibility are connected by 1/chi = 1/psi xx/ +1/psi/sub yy/, a relation which does not appear in any of the related literature which we have examined for an aperture of general shape.

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