Abstracts

A Nonmodal Formulation for Electromagnetic Transmission through a Filled Slot of Arbitrary Cross Section in a Thick Conducting Screen

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This paper considers the two-dimensional problem of electromagnetic transmission through a filled slot of arbitrary cross section in a thick perfectly conducting screen. The equivalence principle is used to divide the original problem into three isolated parts where postulated equivalent sources radiate into unbounded, homogeneous media. These equivalent electric and magnetic currents are chosen to ensure continuity of the tangential components of electric and magnetic fields at each aperture. An integral equation is written for each of the three parts with the equivalent currents as unknowns. The resulting set of coupled integral equations is solved by the method of moments. It is shown in the Appendix that this set of equations has a unique solution. The primary quantities computed are the equivalent magnetic and electric currents on each aperture and the electric current on the remaining portions of the slot cross section. These results are compared with those obtained from a modal solution, where the fields in the slot cross section are expressed in terms of parallel-plate waveguide modes.

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