Abstracts

Electric and Magnetic Coupling through Small Apertures in Shield Walls of Any Thickness

N.A. McDonald. "Electric and Magnetic Coupling through Small Apertures in Shield Walls of Any Thickness." 1972 Transactions on Microwave Theory and Techniques 20.10 (Oct. 1972 [T-MTT]): 689-695.

A method is presented for evaluating the coupling between two identical resonant cavities coupled by a small aperture in a plane common wall of arbitrary thickness. The coupling is related to the frequencies of the symmetric and asymmetric modes of oscillation of the coupled cavity structure, and a variational technique is used to determine those frequencies. The method is applied to circular and rectangular apertures, and it is shown that the coupling is separable into electric and magnetic terms. The results enable theoretical solutions to be obtained for the electric and magnetic polarizabilities of circular and rectangular apertures in walls of zero thickness, and equivalent polarizabilities to be obtained when the wall thickness is nonzero. Curves of numerical values are given for circular and rectangular apertures. With zero wall thickness, the results obtained are the same as those of Bethe for a circular aperture and give good agreement with Cohn's experimental results for rectangular apertures.

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