Abstracts

Rigorous and Numerically Efficient Computation of the Irrotational Electric and Magnetic Eigenfunctions of Complex Gyrotron Cavities (May 1995 [T-MTT])

A. Jostingmeier, C. Rieckmann and A.S. Omar. "Rigorous and Numerically Efficient Computation of the Irrotational Electric and Magnetic Eigenfunctions of Complex Gyrotron Cavities (May 1995 [T-MTT])." 1995 Transactions on Microwave Theory and Techniques 43.5 (May 1995 [T-MTT]): 1187-1195.

For the modal analysis of complex gyrotron cavities, complete sets of eigenfunctions of the corresponding completely shielded cavity are required. In this contribution, it is shown that the generalized scattering matrix method which is well-known for the computation of the resonance modes can also be applied to the calculation of the irrotational electric and magnetic eigenfunctions. The irrotational eigenfunctions are computed for some circularly symmetrical structures. The validity of the method is checked by investigating a spherical cavity for which the analytical solution is known. Furthermore, a special subdivision of tapered cavity sections is preseuted which considerably improves the numerical efficiency of the method. For a standard gyrotron cavity, the field in the source region is computed with and without making use of irrotational electric eigenfunctions. It is demonstrated that the accuracy and the numerical efficiency of the modal expansion of the cavity field in the source region is improved if these eigenfunctions are included in the analysis.

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