Abstracts

Eigenvalue equations and numerical analysis of a coaxial cavity with misaligned inner rod

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Based on the Helmholtz equation, the superposition of cylindrical wave functions, and coordinates transformation, the eigenvalue equation is derived rigorously for a coaxial gyrotron cavity with a misaligned inner rod. It is shown that, due to the existence of the structural misalignment, any single normal mode of a perfect coaxial structure (i.e., without misalignment) no longer simultaneously satisfies both the outer and inner boundary conditions; consequently, the superposition of cylindrical wave functions must be taken into account. A numerical approach of solving the eigenvalue equation is proposed in this paper. As a practical application, analysis is given to the higher mode coaxial cavity employed in a 140-GHz/1.5-MW gyrotron device at the Forschungszentrum Karlsruhe, Karlsruhe, Germany. Result shows that the eigenvalue of the operating mode in a misaligned coaxial cavity is affected noticeably by the structural misalignment.

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