Abstracts

Generalized reaction and unrestricted variational formulation of cavity resonators. II. Nonorthogonal and free-boundary mode-matching method

For pt. I see ibid., vol. 50, no. 11, p. 2480-90 (2002). This paper addresses a systematic method whereby the conventional mode-matching method is generalized to the cases where the set of modes used for the field expansion within a cavity resonator are relaxed to be orthogonal or satisfy any specific boundary conditions. It is shown that this approach is based on the unrestricted variational formulation of a cavity resonator. Reciprocity theorem and generalized reaction are the mathematical foundations of this new formulation. We have shown that the conventional mode-matching method is a special case of this generalized formulation and indeed is variational in nature. More precisely, we have proven that, if the field distribution obtained based on the conventional mode-matching method is used as a trial one in some variational formulas, the resonant frequency will be the same as the one obtained by the mode-matching method.

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