Abstracts

Variational Principles and Mode Coupling in Periodic Structures

Variational techniques are used in analyzing periodic "cold" microwave structures for the angular frequency, omega, as a function of assumed phase shift per periodic cell. Two variational expressions are given: one for omega in terms of the E- and H-fields, and one for $k^2 = \text{omega}^2\mu$ epsilon in terms of the E-field. For structures with relatively light coupling between cells, the trial fields to be used with the variational expressions are composed of closed cavity modes, phase shifted by phi radians from cell to cell. Both variational expressions yield determinantal equations for k^2(phi) which agree with equations previously derived from a mode coupling point of view. One form of an equivalent lumped circuit is given to represent the structure within one of its pass bands. Curves compare the variational-mode coupling expression for k^2(phi) of a periodically lumped loaded transmission line with exact expressions.

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