Abstracts

On the Mode-Coupling Formation of Complex Modes in a Nonreciprocal Finline

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This paper studies and models the mechanism for forming the complex modes commonly found in boxed quasi-planar or planar guided-wave structures. To illustrate the fact that the mode-coupling among the various forms of modes is closely related to the formation of complex modes, the dispersion characteristics of the complex propagation constants (or the so-called mode spectrum) of a nonreciprocal unilateral finline are obtained by the rigorous full-wave SDA (spectral-domain approach). It is found that in the mode spectrum of the nonreciprocal finline, a forward wave and a backward wave interact to produce a pair of complex modes. The interactions between two forward (backward) traveling waves, between a forward wave and a backward wave, and between two complex waves (modes) are modeled by applying the model-coupling theory. The concept of hypothetical modes is introduced in the model. These hypothetical modes are obtained by applying mode-coupling theory to the mode spectrum previously obtained. The approximate values obtained for the propagation constants of the three types of wave interactions using the model presented in the paper are in close agreement with those given by the full-wave SDA.

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