Abstracts

Excitation of leaky modes on multilayer stripline structures

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A quasi-analytical method for calculating the excitation of leaky modes on multilayer stripline structures by a finite source is presented in this paper. Simple sources such as an infinitesimal dipole near the conducting strip or a delta-gap feed on the conducting strip of the transmission line are considered. The method uses a numerically constructed Green's function for the source in the presence of the conducting strip, which is calculated from Fourier transform theory in terms of a one-dimensional Green's function for a line source in the presence of the conducting strip. The numerical Green's function involves a one-dimensional integration in the longitudinal wavenumber plane. The residue contributions from the poles of the Green's function define the excitation amplitudes of the leaky and bound modes that exist on the structure. The numerical Green's function is also used to numerically calculate the complete current on the strip excited by the source. The correlation between the leaky-mode current and the complete current is used to define the extent of the physical meaning of the leaky mode. The generalized pencil of functions (GPOF) method is used to study this correlation by resolving the complete current on the strip into exponential waves, which are then compared with the current of the leaky mode. The physical meaning of the leaky modes is also analytically examined by consideration of the branch cuts in the longitudinal wavenumber plane for the numerical Green's function integration. A "path consistency condition" is established as a necessary condition for the physical meaning of the leaky mode.

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