Abstracts

Approximate analytical evaluation of the continuous spectrum in a substrate-superstrate dielectric waveguide (Dec. 2002 [T-MTT])

In this paper, an original closed-form approximate evaluation is performed for the continuous-spectrum field excited by an infinite line source in a dielectric substrate-superstrate configuration, optimized for leaky-wave radiation. By means of a suitable approximate asymptotic representation obtained via Watson's lemma, the continuous-spectrum field has been expressed as the sum of the contributions of two leaky-pole singularities, each weighted by a transition function that depends on both the frequency and observation distance. The validity of these results is shown in the near and far fields at different frequencies, including the frequency range in which the leaky wave is physical and the entire transition region through the spectral gap. This new closed-form result explicitly shows the nature of the continuous-spectrum field in the transition region, and provides insight into the nature of the fields on more complicated structures in microwave integrated circuits.