Abstracts

The nature of the spectral gap for leaky waves on a periodic strip-grating structure

S. Majumder, D.R. Jackson, A.A. Oliner and M. Guglielmi. "The nature of the spectral gap for leaky waves on a periodic strip-grating structure." 1997 Transactions on Microwave Theory and Techniques 45.12 (Dec. 1997, Part II [T-MTT] (1997 Symposium Issue)): 2296-2307.

The nature of the spectral gap at forward endfire for a periodic leaky-wave structure consisting of an infinite array of metallic strips on a lossless grounded dielectric layer is studied and compared with that for a simple grounded dielectric layer. The conclusions reached are expected to be valid for a general class of open periodic structures. One of the interesting features of the periodic structure is that a different branch choice is possible for each of the infinite number of space harmonics (although most of these will be nonphysical). This leads to an infinite number of steepest descent planes (SDP's) for the modal solutions, instead of only one as for the dielectric layer. As a result, one finds some interesting differences in the spectral-gap behavior, compared with that for the dielectric layer. One basic difference is that the nature of the spectral gap depends on whether or not a second space harmonic begins radiating before the main radiating harmonic is scanned to forward endfire. The spectral gap resembles that for a lossy dielectric layer when a second space harmonic is also radiating, and resembles that for a lossless dielectric layer otherwise. In addition, for the latter of these cases, the purely bound solution (which has a real propagation wavenumber and which occurs at the high-frequency end of the spectral gap) is physical only over a small frequency range, in contrast to the dielectric layer case, where that solution is present and physical at all higher frequencies. These behavioral differences are explained in detail in this paper.

❑ Return to main document.