Electromagnetic Scattering of Finite Strip Array on a Dielectric Slab

A fast recursive algorithm is used to compute the scattering properties of finite array of strip gratings on a dielectric slabs. This algorithm has a computational complexity of $O(N \log^2 N)$ for one incident angle and $O(N^2 \log N)$ for N incident angles. It uses plane wave basis for expanding the incident wave and the scattered wave. The scattered wave is expanded in terms of a Sommerfeld-type integral with spectral distribution along a vertical branch cut, rendering its expansion very efficient. To validate the scattering solution obtained using the recursive algorithm, comparisons with the method of moments are illustrated. The current distributions on the strips and scattering patterns are both presented. Since this algorithm has reduced computational complexity and is fast compared to other conventional methods, it can be used to analyze very large strip arrays. Scattering solution of a 50-wavelength wide strip is illustrated.

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