Abstracts

Analysis of MQW and anisotropic guided wave structures using a full-wave 2D TLM-based FD-TD method

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A 2D full-wave TLM (transmission-line-matrix) technique was reported before for the analysis of arbitrarily shaped guided wave structures. However, the computations involve the operations on the third spatial step /spl Delta/z. In this paper, another 2D full-wave TLM-based method is presented where no third spatial dimension operations are required at all. The method is derived by assuming the field variation of e/sup -j/spl beta/z/ along the z-direction (the propagation direction) in the 3D TLM based finite-difference time-domain (FD-TD) method. As a result, a truly two-dimensional scheme is developed with both electric and magnetic components condensed at every numerical grid point. The method was applied to a microstrip line deposited on an anisotropic substrate and a multiple quantum well (MQW) structure where the dielectric constant of the MQW substrate varies with spatial positions. The numerical results agree well with the results obtained from other techniques, and therefore validate the effectiveness of the 2D technique based on the TLM principle.

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