Abstracts

Foreword (Oct. 1985 [T-MTT])

J.W. Mink and F.K. Schwering. "Foreword (Oct. 1985 [T-MTT])." 1985 Transactions on Microwave Theory and Techniques 33.10 (Oct. 1985 [T-MTT] (Special Issue on Numerical Methods)): 845-846.

Microwave and millimeter-wave integrated circuits of increasing complexity and component density have been designed in recent years and are needed in the future for a wide variety of applications in computers, communications, sensing, signal processing, etc. Elaborate analytical and computational techniques are required for the characterization and synthesis of these circuits. The first step in a systematic approach to this problem is an accurate theoretical description of the basic building blocks from which these circuits are constructed, i.e., of microwave and millimeter-wave transmission media and active and passive components, including their mutual interaction in an integrated-circuit environment. There are several problem areas here where basic contributions to the state-of-the-art are needed. To name a few: the description of the effects of substrate anisotropy on the performance of open and shielded waveguides; the characterization of transitions and discontinuities in microwave/millimeter-waveguides, to include the case of active components monolithically integrated in these guides; and the accurate description of the effects of finite conductivity on the current distribution and losses in the metal parts of millimeter-wave transmission lines, in particular when the metallization thickness is in the order of or smaller than the skin depth. The complexity of these problems usually does not allow the development of analytical solutions, and advanced numerical methods are needed. Basic requirements on such methods include high accuracy -- or at least controlled accuracy -- and numerical efficiency. Moreover, while these techniques will always involve numerical evaluations, they should not degenerate into brute force computer methods. It is desirable that they can be carried through to a large extent analytically in order to facilitate physical understanding of the phenomena involved.

❑ Return to main document.