Abstracts

Guided-wave properties of synthesized nonradiative dielectric waveguide for substrate integrated circuits (SICs)

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This paper presents the very first investigation of guided-wave properties of a non-radiative dielectric (NRD) guide synthesized on a single substrate for the design of substrate integrated circuits (SICs). The synthesis of the new NRD-guide is made possible by removing part of the substrate or by punching hole or slot arrays that results in two separate lower dielectric-constant regions to which the core NRD strip is bounded. A mode-matching technique is applied to model this guided-wave problem that takes into account various parametric effects of geometry. Propagation constant, leakage loss and modal characteristics are studied for the synthesized NRD-guide structure. The results show that a synthesized NRD-guide can effectively be co-designed with planar circuits based on the same substrate to form a new class of integrated circuits called "substrate integrated circuits" (SICs). This work is useful for the development of low-cost and high-density millimeter-wave ICs.

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