Abstracts

Electric-magnetic-electric slow-wave microstrip line and bandpass filter of compressed size

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This paper presents a novel integrated microstrip low-loss slow-wave line. The new microstrip replaces the conventional metal strip by composite metals paralleling the electric surface and magnetic surface (MS). The MS made of an array of coupled inductors shows a high-impedance state in the stopband, below which the propagation properties can be well controlled by varying the dimensions of the electric surface and MS. The dispersion curves obtained by matrix-pencil analyses closely correspond to those obtained by scattering-parameter extraction. Theoretical results, as confirmed experimentally, indicate that an increase of over 60% in the slow-wave factor can be achieved without sacrificing propagation losses, using the proposed structure. This electric-magnetic-electric (EME) microstrip is insensitive to the alignment position of the periodical structure, and can be constructed using conventional printed-circuit-board fabrication processes and integrated with other microwave components in a multilayered circuit. A compact EME bandpass filter (BPF) with suppressed harmonic responses is presented. The length of the filter is reduced by 26%, and the measured insertion loss and fractional bandwidth is comparable to that of a conventional microstrip BPF on the same substrate.

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