Abstracts

Full-Wave Analysis and Design of a New Double-Sided Branch-Line Coupler and its Complementary Structure

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A new double-sided branch-line coupler using microstrip lines as input/output lines and slotlines as branches is analyzed and designed. The even-odd mode theory is first used to analyze the ideally simplified circuit model and to find out the preliminary circuit dimensions. Based on these dimensions, the full-wave spectral domain approach (SDA) is employed to accurately simulate the circuit performance. By the formulation of the exact Green's function in the spectral domain, the effects of surface wave and radiation phenomena are accurately accounted for. Experimental data agree very well with the SDA simulation results. It is found that the even-odd mode theory which neglects discontinuities between lines is not enough to design a coupler. The SDA code can then be used to accurately simulate and optimize the circuit performance. The complementary structure with slotlines as input/output lines and microstrip lines as branches is also investigated both theoretically and experimentally. It is noticed that the radiation and leakage from the two double-ended branches for all structures will deteriorate the circuit performance.

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