Abstract

Analysis and design of coplanar waveguide (CPW) and coplanar strips (CPS) with thick conductors and finite substrate thickness is presented. The thickness of the conductors could be as large as the gap width or strip width. The analysis has been carried out using various techniques like conformal mapping method (CMM), finite difference method (FDM), spectral domain method (SDA) and finite element method (FEM). The singular integrals associated with CMM are carried out numerically based on NIntegrate. The results of CMM are curve-fitted to obtain simple closed-form expressions for the equivalent zero thickness strip width and gap width. These expressions are used in the calculation of effective dielectric constant and characteristic impedance of the coplanar lines to correct for conductor thickness, and compared with expressions available under thin strip approximation. The validity of duality assumption between CPW and CPS, and partial capacitance approach are examined. A separate parallel plate capacitance model for the gap capacitance between the coplanar strips has also been developed. V-groove microshield and microstrip lines have been studied from the perspective of reducing coupling between the adjacent lines. It has been found that the crosstalk can be reduced to almost 25 dB by using metallized V-grooves.