A New Class of Interdigital Capacitors for Planar Integrated Circuits

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A new class of planar interdigital capacitors (*IDCs*) useful to be employed in wireless communication systems are presented and analyzed in detail. The electromagnetic characteristics of the proposed structures, derived by means of a new locally conformal *FDTD* scheme, are compared in order to establish their circuital and *EMC* performances. Interdigital capacitors having zig-zag and sinusoidal shape fingers are analyzed and a new frequency-independent equivalent circuit, which includes surface and volume waves effects, useful to be employed in *CAD* tools, has been introduced. The particular form of the capacitor's fingers has been chosen so to obtain compact structures with a higher value of the series capacitance. To establish the main characteristics of the proposed structures circuital and *EMC* characteristics are compared with those obtainable using *IDCs* having straight fingers. As an example, in Fig. 1a the geometry of an *IDC* structure having zig-zag finger is shown.

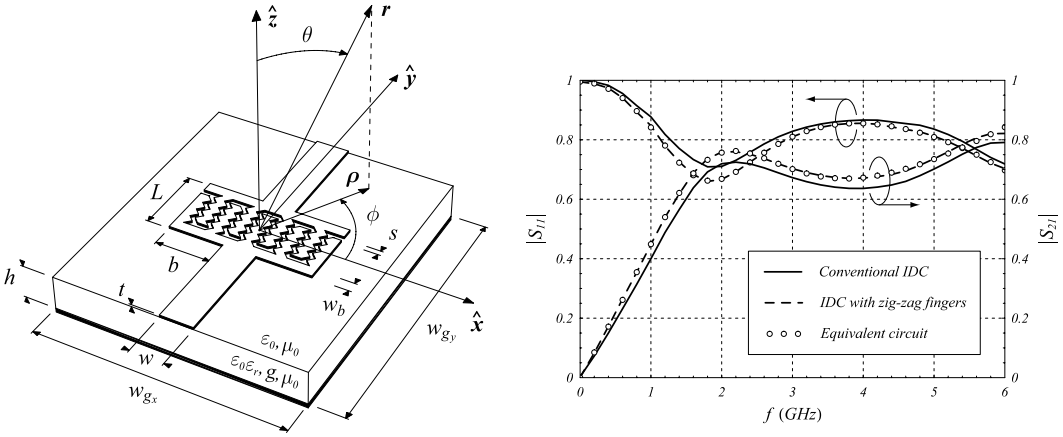

Fig. 1 Geometry (a) and magnitude of the scattering parameters versus frequency (b) of a planar interdigital capacitor having zig-zag fingers. Substrate parameters: h=1.27 mm, ε_r=10.2.

The magnitude of the scattering parameters in the frequency range *0-6 GHz*, obtained employing the *FDTD* technique, is given in Fig. 1b. From Fig. 1b, it is evident that a stronger coupling between the input and output ports of the devices appears in the structure having zig-zag fingers. It can be demonstrated that this particular behaviour is due to the higher reactive energy stored between the zig-zag fingers, which results in a higher value of the series capacitance. Finally, from the same figure it appears the good numerical accuracy obtainable using the proposed frequency-independent equivalent circuit of the device. Details concerning the analysis model, the equivalent circuits, the circuital and the emission characteristics of the proposed structures, will be given during the symposium presentation.