Abstracts

TEM Coupling Between Orthogonal Crossing Wires: A Closed-Form Approximation

J.L. Young. "TEM Coupling Between Orthogonal Crossing Wires: A Closed-Form Approximation." 1994 Transactions on Microwave Theory and Techniques 42.5 (May 1994 [T-MTT]): 884-890.

The equations describing the coupling mechanism between two crossing, orthogonal thin wires over a perfectly conducting ground plane are derived from first principles. Cast in the form of two cross-coupled Fredholm integral equations of the second kind, the equations are manipulated in such a way as to show the nature of the coupling between the TEM modes, the evanescent modes and the radiation terms. The assumption is made that the coupling between the evanescent and radiation terms to the TEM mode is weak after the first wave bounce. By neglecting such effects, we derive a closed-form approximation for the equivalent lumped junction capacitances. The resulting expressions are surprisingly simple and are amenable to desktop calculation. The final formulas are numerically compared with previously published data.

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