Least-Weighted-Square Method for Analysis and Synthesis of Transmission Lines

Analysis and synthesis of transmission lines of arbitrary geometry are not easy to realize with currently available methods. The object of this paper is to show that by introducing a new principle to be called the "least-weighted-square invariance deformation," it is possible to solve transmission line problems to desired orders of accuracy. A procedure based on this principle is given for deforming a given transmission line geometry keeping the characteristic impedance an invariant, or for synthesizing a transmission line cross-sectional geometry corresponding to the given constant parameters of the structure. The method is applied to the analysis of transmission lines having a regular polygonal outer conductor and a circular inner conductor. An application to a representative situation in synthesis is also described.

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