Abstracts

Time-Domain Perturbational Analysis of Nonuniformly Coupled Transmission Lines

A method of analyzing the time-domain behavior of a pair of nonuniformly coupled, dispersionless transmission lines is presented. The coupling coefficient of the system is assumed to be slowly varying with position. The set of coupled equations is transformed into a form for which the method of characteristics applies. Instead of numerically integrating the coupled equations, we decouple the equations by writing the solution in the form of a perturbational series. The resulting zeroth-order term corresponds to the inverse transform of the WKB approximation in the frequency domain, which contains only the wavefront and amplitude information. The higher order terms can be directly interpreted as reflections along the lines. Causality is satisfied to all orders. This method has the advantage of easier implementation, and is more versatile than frequency-domain methods as well as the brute-force numerical integration of the coupled partial differential equations.

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