Abstracts

A simple equation for analysis of nonuniform transmission lines

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The solution to the telegrapher equations is often presented as a D'Alembert expression for the voltage in terms of the voltage at a previous time or for the current in terms of the current at a previous time. In this paper, we present a complete solution for the coupled set of transmission-line equations such that the voltage or current is in terms of both the previous time voltage and current amplitudes. The key features of these equations are: they require only the initial voltage and current amplitudes, positive- and negative-direction traveling waves do not have to be identified, they are valid on a nonuniform transmission line, and they are related to the frequency-domain ABCD-parameter equations and the D'Alembert expressions for coupled functions. A method is presented for evaluating this set of equations numerically and results are given for a transmission-line filter and for a transmission line with a nonuniform section.

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