Abstracts

Transient Analysis of Single and Coupled Lines with Capacitively-Loaded Junctions

Transient processes are studied for a single line or a pair of coupled lines consisting of line sections with different characteristic admittances and with capacitances loaded at the junctions of line sections. Equations for the Laplace transform of the reflection and transmission coefficients of single and coupled lines are derived for the general case. When the capacitances are loaded at regular intervals, the corresponding expressions of the transient response waveforms at different terminal ports of these lines for both a step and a ramp input are developed. Based on the theoretical analysis, we illustrate the transient responses to ramp signals on some simplified computer signal lines, such as parallel-plate lines with transverse ridges, and parallel striplines with perpendicular crossing strips sandwiched between common upper and lower ground planes. The numerical results suggest that signals with a rise time of $t_r/ < 50$ ps will cause too much distortion, and should not be used when the length of the line is longer than 2 cm.

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