Abstracts

Dispersion Characteristics of Optically Excited Coplanar Striplines: Pulse Propagation

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This paper analyzes the propagation of optically excited picosecond electrical pulses on coplanar striplines. A full-wave analysis method that includes dispersion and losses over terahertz bandwidths is outlined. Results of the full-wave analysis are interpreted in terms of the underlying physical phenomena. The full-wave analysis reveals the existence of peaks in the dispersion curve of the coplanar stripline. These are interpreted in terms of the onset and coupling of the substrate modes to the transmission line mode. Results of the full-wave analysis are in good agreement with those obtained by established theory. Pulse propagation is simulated using the dispersion and loss data obtained from the analysis and accounts for all the relevant mechanisms. Results of simulations are compared with experimental data available in the literature for normal as well as superconducting lines. It is demonstrated that the superconducting phenomena are not dominant, whereas modal dispersion and substrate losses dominate the evolution of the output pulse and must be included for accurate modeling of pulse propagation on coplanar striplines.

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