Abstracts

Voltage Calibration of the Direct Electrooptic Sampling Technique

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A detailed study of various voltage calibration factors for the direct electrooptic sampling technique is presented. In reflection mode optical probing, the circuit substrate forms an etalon for the optical probe beam. Analytical expressions for the calibration factors due to etalon effects and decaying surface potentials are derived. Depending on the length of the sampling pulse relative to the substrate transit time, the etalon will affect either the voltage calibration factor or the system bandwidth. For pulses long compared to the transit time, interference at the surface results in a probe wavelength dependent storage time effect. The resulting electrooptic signal shows a resonant behavior as a function of wavelength or substrate thickness, For pulses short compared to the substrate transit time, multiple reflections reduce the effective system bandwidth to a bandwidth less than that given by the single transit time or the sampling pulse width. Experimental verification of the theoretical results are presented. Various deembedding procedures for implementing the voltage calibration are discussed.

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