Abstracts

Propagation in Layered Biased Semiconductor Structures Based on Transport Analysis

C.M. Krowne and G.B. Tait. "Propagation in Layered Biased Semiconductor Structures Based on Transport Analysis." 1989 Transactions on Microwave Theory and Techniques 37.4 (Apr. 1989 [T-MTT]): 711-722.

A transport-field parallel-plate formulation and solution method to determine the small-signal propagation constant is given for wide microstrip lines over an inhomogeneously doped semiconductor substrate of small transverse dimensions. Included in the detailed transport model are two carrier species, recombination-generation mechanisms, dc and ac field-dependent nobilities and diffusion constants, and boundary condition contact effects. A transverse dc bias condition is applied. Structures numerically simulated are a voltage-variable GaAs distributed Schottky barrier phase shifter and a transmission line over a Si bipolar junction. Numerical data based on a finite difference technique are generated on carrier densities, electric potentials and fields, and current densities. Propagation constant calculations were favorably compared with those calculated by both full-wave field analysis and moments-of-the-Boltzmann-equation analysis for some less general cases. gamma results for the GaAs structure we compared with available experimental data.

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