Abstracts

Complete Sliced Model of Microwave FET's and Comparison with Lumped Model and Experimental Results

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This paper describes a rigorous and systematic procedure to derive a unified and complete semidistributed FET model that can be easily implemented in CAD routines of simulators. We have used the three coupled-line theory, including active and passive electromagnetic coupling between the semiconductor electrodes. The analytical formulas are given in order to calculate the capacitances of the electrodes and sufficient agreement is obtained in comparison with numerical analysis. For the first time, the experimental data of the device are compared with full three coupled-line theory and three coupled-line sliced model. This full semidistributed approach to FET modeling is applied to the analysis of a submicrometer-gate GaAs FET at centimeter and millimeter-wave frequencies, and the results are compared with the lumped element approach. The maximum available power gain (MAG) and the maximum stable power gain (MSG) of the device is calculated as a function of device width and frequency. Both the losses caused by the channel and those caused by the finite electrode conductivity are included. Good agreement is obtained between theory and experiment.

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