Abstracts

Gain Partitioning: A New Approach for Analyzing the High-Frequency Performance of Compound Semiconductor FET's

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A new approach for analyzing the high-frequency performance of compound semiconductor FET's is presented. The approach is based on a circuit description that separates intrinsic and parasitic circuit elements of active devices in a general way. Mason's gain (U) and current gain (A/sub i/) have been used to illustrate this approach, since their unity gain frequencies, f/sub max/ and f/sub tau/, respectively, are good indicators of high-frequency performance. Significant results from U have been related to a more commonly used nomenclature involving maximum stable gain (MSG) and maximum available gain (MAG) and, in particular, to the transition from a potentially unstable device to a potentially stable device. Results presented here show that tlhe requirements to maximize these cutoff frequencies are different. Minimized parasitic circuit elements maximize f/sub tau/. A maximized f/sub max/, on the contrary, may be obtained if interactions of parasitic and intrinsic circuit elements satisfy certain conditions. The method presented here should be used in conjunction with software that can specify the physical structure required to realize those circuit elements.

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