Abstracts

Large Signal Design of Broadband Monolithic Microwave Frequency Dividers and Phase-Locked Oscillators

R. Quere, E. Ngoya, M. Camiade, A. Suarez, M. Hessane and J. Obregon. "Large Signal Design of Broadband Monolithic Microwave Frequency Dividers and Phase-Locked Oscillators." 1993 Transactions on Microwave Theory and Techniques 41.10 (Nov. 1993 [T-MTT]): 1928-1938.

This paper presents a design method for phase-locked devices such as frequency dividers or injection-locked oscillators. The method requires a full nonlinear analysis of the circuit. This analysis relies upon Harmonic Balance techniques and is suitable for monolithic circuits simulation. First, a modified formulation of the general harmonic balance equation is proposed which includes the presence of probes. These probes allow us to suppress the degenerated solution of the HB equation in autonomous cases. Moreover, a global stability analysis of phase-locked regimes is carried out. It provides invaluable information on the nonlinear behavior of the device. In particular, synchronization bandwidths as well as power ranges for which the circuit can be synchronized are obtained from the stability loci drawn in the parameter space. All these features have been used to design a broadband monolithic frequency divider, and the simulated and experimental results have been compared with very good accuracy. Therefore, the method proposed is a very useful tool for the design of potentially unstable circuits.

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