Abstracts

Synchronization analysis of autonomous microwave circuits using new global-stability analysis tools

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A new spectral-balance technique for the global-stability analysis of autonomous circuits is presented in this paper. This technique relies on the introduction of measuring probes into the circuit and it allows a simple determination of both bifurcation diagrams and bifurcation loci as a function of any suitable parameter. Through the proposed algorithms, this kind of analysis can be easily added to any existing software, since it is performed externally to the harmonic-balance (HB) calculation. Due to its local nature, it also allows an easy selection of the bifurcation parameters, which spreads the simulation possibilities. Both periodic and quasi-periodic regime simulations are possible, and bifurcations are detected in both operating modes. The synchronization phenomenon in injected oscillators and frequency dividers is also analyzed in detail for an accurate prediction of the operating bands. The simulation techniques are illustrated by means of their application to a cubic nonlinearity oscillator. They are then used for the stability analysis of a monolithic microwave integrated circuit (MMIC) divider by two operating in the millimetric range. A very good agreement has been obtained with the experimental results.

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