Quadrature RCOscillators: The van der Pol approach

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Abstrak

This book presents a tutorial review of van der Pol model, a universal oscillator model for the analysis of modern RCoscillators in weak and strong nonlinear regimes. A detailed analysis of the injection locking in van der Pol oscillators is also presented. The relation between the van der Pol parameters and several circuit implementations in CMOS nanotechnology is given, showing that this theory is very useful in the optimization of oscillator key parameters, such as: frequency, amplitude and phase relationship. The authors discuss three different examples: active coupling RCoscillators, capacitive coupling RCoscillators, and two-integrator oscillator working in the sinusoidal regime.

· Provides a detailed tutorial on the van der Pol oscillator model, which can be the basis for the analysis of modern RCoscillators in weak and strong nonlinear regimes;
· Demonstrations the relationship between the van der Pol parameters and several circuit implementations in CMOS nanotechnology, showing that this theory is a powerful tool in the optimization of key oscillator parameters;

· Provides three circuit prototypes implemented in modern CMOS nanotechnology in the GHz range, with applications in low area, low power, low cost, wireless sensor network (WSN) applications (e.g. IoT, BLE).