Abstracts

A Theoretical and Experimental Study of the Noise Behavior of Subharmonically Injection Locked Local Oscillators

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A method for the noise characterization of optically controlled subharmonically injection locked oscillator; is presented. Based on a nonlinear model of synchronized oscillators, this method is used to formulate a general expression for phase noise calculation, so that FM noise degradation of a subharmonically synchronized LO at large-signal levels can be predicted easily and accurately. The theoretical analysis shows that 1) the n th-order subharmonic injection lacking oscillator is primarily locked by the nth harmonic output of an injected signal, which is generated by the nonlinearity of the active device; 2) the minimum FM noise degradation factor of the nth order subharmonically locked oscillator is n/sub 2/ when the injection power is sufficiently strong; 3) a subharmonic injection locking LO with low injection power, good, FM noise degradation and large locking range can be designed by determining the optimum injection power level, by selecting the optimal nonlinear multiplication factor, and by decreasing the intrinsic noise level of the active device. The experimental results of the FM noise measurement of an oscillator confirmed the accuracy of the analysis.

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