Abstracts

Optical generation of a megahertz-linewidth microwave signal using semiconductor lasers and a discriminator-aided phase-locked loop

Z.F. Fan and M. Dagenais. "Optical generation of a megahertz-linewidth microwave signal using semiconductor lasers and a discriminator-aided phase-locked loop." 1997 Transactions on Microwave Theory and Techniques 45.8 (Aug. 1997, Part II [T-MTT]): 1296-1300.

A discriminator-aided optical phase-locked loop (OPLL) with significantly enhanced frequency acquisition capability is presented. Its pull-in range is measured to be 300 MHz and can be easily extended further. Two grating-tuned external-cavity semiconductor lasers (ECSLs) were realized with more than 30-dB side-mode suppression ratio. These two lasers were allowed to beat on a fast detector and were offset phase locked. The generated microwave signal was found to be a replica of the reference RF signal close to the carrier, The noise level was measured to be -70 dBc/Hz close to the carrier and less than -100 dBc/Hz at 4 MHz away and beyond from the carrier. The total phase variance is 0.11 rad/sup 2/ over a 500-MHz bandwidth. The linewidth full width at half maximum (FWHM) of the locked signal was directly measured to be of order 1 mHz.

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