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Optical Heterodyning of Injection-Locked Laser Sources: A Novel Technique for Millimeter-Wave Signal Generation

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Abstract : A novel technique has been developed to generate ultra-stable millimeter-wave signal by optical heterodyning of the output from two slave laser (SL) sources injection-locked to the sidebands of a frequency modulated (FM) master laser (ML). Precise thermal tuning of the SL sources is required to lock the particular slave laser frequency to the desired FM sidebands of the ML. The output signals from the injection-locked SL when coherently heterodyned in a fast response photo detector like high electron mobility transistor (HEMT), extremely stable millimeter-wave signal having very narrow line width can be generated. The scheme may also be used to generate ultra-stable sub-millimeter-wave/terahertz signal.

Keywords : FM sideband injection locking, master-slave injection locking, millimetre-wave signal generation, optical heterodyning
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