Abstracts

Comparison of optical processing techniques for optical microwave signal generation

A.J. Lowery and P.C.R. Gurney. "Comparison of optical processing techniques for optical microwave signal generation." 1998 Transactions on Microwave Theory and Techniques 46.2 (Feb. 1998 [T-MTT]): 142-150.

Recently, there have been several proposals on using the higher RF harmonics of detected pulses from mode-locked semiconductor lasers as a source of microwave and millimeter waves. This paper compares the performance of three optical techniques of signal processing that have been proposed to select a higher harmonic of a mode-locked laser, by using extensive numerical simulations. We show that techniques using delays and splitters are insensitive to the coherence properties of the source, but can introduce amplitude patterning if pulses overlap when recombined. We see that techniques relying on optical filtering to select optical modes require extremely high-Q filters and, thus, are extremely sensitive to tuning. A Fabry-Perot interferometer (FPI) is the optimum fitter method in terms of power efficiency for low harmonics, but using two separate bandpass filters can give comparable efficiency when selecting higher harmonics. We also show that gain-switched lasers are unsuitable as sources when used with narrow-band optical filtering techniques because of their low pulse-to-pulse optical coherence.

❑ Return to main document.