

344

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Title:Realization method of range resolution of sub-millimeter in widely tunable laser radar

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Abstract:The reason that widely tunable laser radar with single coherent channel could not achieve fine range resolution agreed with nominal value despite of its huge bandwidth and the factor that leads to nonlinear frequency modulation phase error were analyzed theoretically. Widely tunable laser radar system with two coherent channels was set up to resolve this problem. The chirp bandwidth of system was THz magnitude. Reference channel with fixed delay was added in this dedicated system, and the active signal processing method was utilized. After the phase error was extracted from reference channel, the phase error in target channel was computed and compensated for it adaptively. Results of experiment prove that, the range resolution of this kind of system is improved from about "m" magnitude to 200 μm which is approaching nominal value of 120 μm , and the weakest echo power for ranging reaches as low as 100 pW. This technique is shown to work even if the delays of target and reference channel are not equal.

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Controlled terms:Bandwidth - Laser tuning - Optical radar - Radar systems - Range finding - Signal processing

Uncontrolled terms:Chirp bandwidth - Dedicated systems - Fixed-delay - Non-linear frequency modulations - Phase error - Phase error compensations - Range resolution - Realization method - Reference channels - Submillimeters - Widely tunable lasers

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