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## Construction and Demonstration of a Coherent Doppler Radar

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### Abstract

This article reports work on constructing a coherent Doppler radar using optical heterodyne detection principle to detect weak signals. Various independent factors and conditions of operation influencing this system were inspected. These factors are: A: local oscillator power, that demonstrated considerable influence on the beating frequency ability rising. It is established that its amount should essentially be few times bigger than the reflected signal from the moving object. B: atmospheric attenuation, this effect shows to have significant effectiveness on the laser power especially the humidity effectiveness on CO<sub>2</sub> laser radiation. C: the reflectivity of some tactical objects that display considerable absorption to the laser radiation. D: the signal to noise ratio that facilitated concluding judgments concerning the differentiation between direct and indirect detection effectiveness. Moreover, computer guided optical radars for measuring object velocities with both CO<sub>2</sub> and laser diode were set up on laboratory measure employing a Mercury Cadmium Tellurium (MCT) and Silicon detectors respectively. Different moving objects at different velocities were studied. Doppler shifts, modulation frequencies and laser wavelengths were conveyed to a PC, which was capable of displaying moving object velocities.

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