Cost Efficient Heterodyne Millimeter-wave Doppler Radar Employing Neon Lamp as Detector

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A cost efficient heterodyne Doppler radar at 35 GHz has been developed as a mock-up model for a THz system. Building upon an earlier implementation of Doppler radar at 0.15THz employing interferometric technique based on a phase modulated reference signal (IEEE Trans. Terahertz Science and Technology, v. 4, pp. 307-313, May 2014,) the concept is extended to the introduction of a two-phase chopper for the 35 GHz millimeter-wave beam launched from a dielectric- lens loaded horn antenna. For cost effectiveness, a Gunn diode source is used for signal generation and a neon lamp is employed as detector. Phase sensitive detection with heterodyne scheme provides improved sensitivity, while the two-phase chopper enables both the amplitude and phase of the radar signal to be determined. The ability to recover the full set of parameters (amplitude and phase) of the complex radar signal with advanced signal process technique will enable greater versatility in post detection signal processing for target characterization and identification. Implementation and procedure for calibration of the system will be presented along with measurement results on sensitivity and target resolution.