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Calibration of a Six-Port-Based CW Radar Using Unknown Positions of a Target

Abstract: In this paper a new approach to calibrate continuous-wave radars that utilize a six-port interferometer, is proposed. The presented procedure makes use of an arbitrary number of unknown target's positions and is suitable for near field application. With this calibration method also a target that changes its radar cross-section along the measured distance can be used. The procedure was tested utilizing a six-port-based continuous-wave radar operating at 2.35 GHz for various number of target's positions and their spread, showing the obtainable distance measurement error not exceeding 0.012 of the wavelength. Furthermore, the obtained measurement error distribution allows for defining simple and practical guidelines for calibrating radars with the use of the proposed method.