Abstracts

An X-Band Acousto-Optic Variable Delay Line for Radar Target Simulation

M.C. Zari, C.S. Anderson and W.D. Caraway, III. "An X-Band Acousto-Optic Variable Delay Line for Radar Target Simulation." 1995 Transactions on Microwave Theory and Techniques 43.8 (Aug. 1995 [T-MTT]): 1889-1894.

The design and characterization of a 54-µs, continuously-variable, acousto-optic (AO) delay line developed for radar testing applications is presented. Design goals for the delay line include over 10 MHz of instantaneous bandwidth, 1.2 GHz of tunable bandwidth operating at X-band, 45 dB of dynamic range, and electronically-controllable delay selection to simulate dynamic radar targets with radial range rates up to 500 m/s. In addition, the device was designed to have phase noise and spurious signal levels compatible with high performance radars. To achieve these goals, a 33-MHz center frequency variable delay line was constructed and coherent frequency translation was used to provide operation at X-band. Operating principles for this new intermediate frequency (IF) delay line are presented, and key component issues are discussed. A computer design and analysis tool is described that predicts delay line performance. Experimental results are presented at both the IF and at X-band.

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