Abstracts

Laser-Acoustic Microwave Signal Processing

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The variable delay and processing of RF and microwave signals is a current problem of considerable importance both for the many military applications in radar and electronic countermeasures and for the civilian applications in signal processing. The very low velocity of acoustic waves, as compared to the propagation velocity of electromagnetic signals, permits the fabrication of physically compact systems capable of storing and processing electromagnetic signals. For example, a 1 µsec delay in a non-acoustic delay line might require 700 feet of coaxial cable as compared to the ½ cm of material required in an acoustic delay line. While acoustic delay lines have fulfilled many of the needs of fixed delay lines, adequate continuously variable delay lines are not presently available. Among the several suggestions for obtaining a continuously variable delay, the use of the laser-acoustic interaction has been shown to be among the most promising. This paper will discuss the principles of such a laser-acoustic delay line and the extension of this device to a microwave signal processing device for performing either time compression, expansion and reversal or pulse compression, expansion and reversal.

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