Abstracts

The Use of Surface-Elastic-Wave Reflection Gratings in Large Time-Bandwidth Pulse-Compression Filters

R.C. Williamson and H.I. Smith. "The Use of Surface-Elastic-Wave Reflection Gratings in Large Time-Bandwidth Pulse-Compression Filters." 1973 Transactions on Microwave Theory and Techniques 21.4 (Apr. 1973 [T-MTT] (Special Issue on Microwave Acoustic Signal Processing)): 195-205.

A new type of surface-wave device has been developed which uses the reflection of surface elastic waves to achieve a desired transfer function. A series of experiments on the reflection of surface waves at normal and oblique incidence from periodic arrays of grooves and overlayer stripes provided guidelines for the choice of the type of reflector, the reflection angle, and the depth of grooves. A prototype pulse-compression filter with a time-bandwidth product of 1500 (T=30 µS, Delta f=50 MHz) has been developed. The grooves were etched into LiNbO/sub 3/ by a neutralized argon ion beam in a manner which provided precise depth control and a desired amplitude response. This reflective-array compressor (RAC) has proved to be relatively free of spurious signals and second-order effects and, as a result, large capacities have been obtained. In the prototype device, rms phase errors were 3.5 deg or less and, as a result, the compressed-pulse sidelobe structure was near ideal. A compression ratio of 1500 was demonstrated. The same device, when operated over a wider bandwidth, yielded a compression ratio of about 4000 with only a modest sacrifice in the level of the time sidelobes.

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