Abstracts

Sidelobe Suppression in Low and High Time-Bandwidth Products of Linear FM Pulse Compression Filters

The peak sidelobe suppression of unweighed linear FM surface acoustic wave filters limits the dynamic range of pulse compression systems. Using a discrete inverse Fourier transform "sampling technique" and complex Fresnel integral algorithms, this paper extends previous results of other authors from a time-bandwidth product of 50 up to the high value of 720. In the present work, the weighting is applied in the frequency domain, employing an external Hamming weighting function. The output waveforms are determined for different sampling rates. The results show that a peak sidelobe suppression of -38 dB from the main lobe is achieved for high time-bandwidth product (TB = 720) at a sampling rate of 512 with broadening in the main lobe, while it is -41 dB for a low time-bandwidth product of TB = 50. Also, the paper contains charts showing the sidelobe suppression of unweighed and Hamming externally weighted linear FM pulse compression filters at different values of time-bandwidth products TB (50,100,250,370,510,720) with different central frequencies, dispersion times, and bandwidths B. The skirt steepness, sidelobe ripple rejection, Gibbs ripples of the wave spectrum, reduction of the insertion loss, and suppression of Fresnel ripples are also compared.

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