Short Communication

Sharpening the response of an FIR filter using fractional Fourier transform

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Abstract

In this paper a methodology to sharpen the transition band of a linear phase, finite impulse response (FIR), Kaiser window filter using fractional Fourier transform (FRFT) is proposed. Transition bandwidth of a window-based FIR filter is proportional to the main lobe width of the window function used and FRFT of Kaiser window exhibits shrinkage in the main lobe width as the FRFT angle is reduced. Thus, apart from the traditional usage of window shape parameter and window length, FRFT angle can be used as a third parameter to effect changes in the frequency response of a window-based FIR filter. The merit of using FRFT in FIR filter design is that the impulse response need not be recomputed to improve filter sharpening and thus online improvement in the frequency response can be obtained.

Keywords: Kaiser window, FIR filter, fractional Fourier transform.

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