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Real Time Application of Fourier Transforms

S.Shenbaga Ezhil
Department of Mathematics, AMET University, Chennai, India

Abstract

In recent days increasing the use of Fourier transform in various applications. The Fourier transform is the simplest among the other transformation method. It is less time consuming, used in power distribution system, mechanical system, industry and wireless network. Mainly in power distribution system the mitigation of power quality disturbance require fast, accuracy and high noise immune method. In the Fourier Transform (FT) area, the advancements of oversampling, computerized sifting and clamor molding are generally received for smothering the quantization commotion. The powerful quantize bits of an ADC are enhanced in view of these techniques. In any case, when preparing the wideband signs for example, linear frequency modulation flag, these strategies can't get viable results, and need high testing rate.

Keywords*: Fourier transform (FT), power quality distribution (PQD), stock well transform (ST), fractional Fourier transform (FRFT)*

1. Introduction

In power system the use of power production as well as power distribution process is very important [1]. The amount of power is reduced during distribution (transformation) because the fault, degradation of load switching, energized transformation and capacitor switching. The above factors arises the problems in PQD system such as sag, swell, interruption, transient, harmonics, notch, flicker and spikes [2]. The improvement of power Signal processing (SP) by using the proposed transformation. PQDs are inherently non-stationary in nature and require simultaneous time-frequency analysis [3]. Some popular techniques used for PQ analysis are: Short-time Fourier transforms (STFT), Gabor transforms (GT), Hilbert-Huang transforms (HHT), Kalman filters (KFs), parametric methods (PMs), Wavelet transform (WT) and Stockwell transform (ST) [4].

The constant fragmentary Fourier change (FRFT) is helpful in optics and flag preparing. With a specific end goal to utilize FRFT in discrete cases, Pei and Yeh characterized the discrete partial Fourier change (DFRFT). The DFRFT is the single-parameter speculation of the discrete Fourier change (DFT), which takes a fragmentary power parameter on Eigen values of the DFT [5]. Image Super Resolution Using Wavelet Transformation Based Genetic Algorithm is presented in this paper [6]. In DFRFT eigenvectors are figured from a DFT-driving grid determined by Dickinson and Stieglitz. Since eigenvectors of the Dickinson-Stieglitz DFT-driving lattice are tests of Hermit-Gaussian capacities, yield of the proposed DFRFT in contains practically tests of the comparing nonstop FRFT.

In this research paper discussed about the Removal of herringbone effects from AEM data maps using the Radon transform [7]. Fourier transform is used to analyze the circuits, control system design and used in signal processing. In signal processing the proposed transform identify the noise, distortion, interference present in the signal. Conductivity-depth transformation of slingram transient electromagnetic data is presented in this paper [8].

2. Proposed Fourier transform

Consider a time signal x (t) whose β order of fractional FT is represented by $F^{B}[X(t)]$. Three operations are required such as initial chirp multiplication g (t), chirp convolution h (t), final chirp multiplication to obtain the $F^{\beta}[X(t)]$.

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$$g(t) = e^{-i\pi t^2 \tan\left(\frac{\theta}{2}\right)} X(t)$$

$$h(t) = K_\theta \int_{-\infty}^{\infty} e^{i\pi \cos(\theta)(t-\tau)} g(\tau) d\tau$$

$$F^\beta[X(t)] = e^{-i\pi t^2 \tan\left(\frac{\theta}{2}\right)} h(t)$$

The chirp has 24 operations it support the transformation of a time-domain signal into Fourier or frequency-domain. Due to 25 operations, the intermediate domain representations (at fractional orders) are obtained as chirp. The fractional Fourier domain is shown in figure 1.

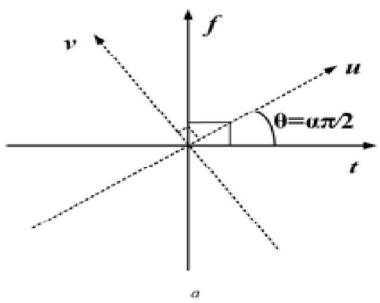

Figure 1. Fractional Fourier domain

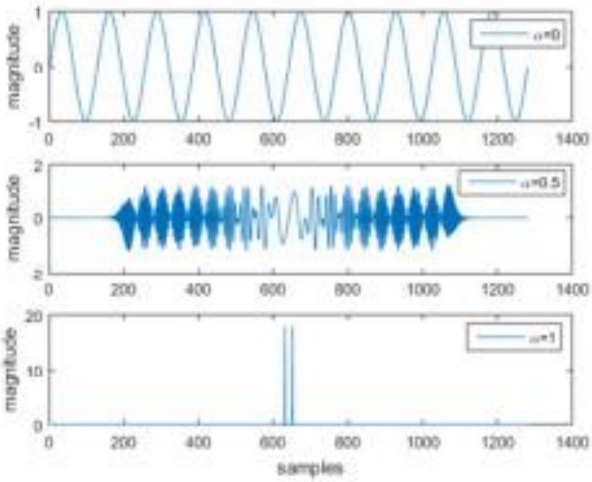

Figure 2. Fractional Fourier of sine wave at different order

The flowchart of proposed Fourier transformation method is shown in figure 3. Prepare an input matrix HMNO, where P is the total number of signals (including all PQD classes) and N is the number of samples in each signal. FRFT of each row (S_i) of input matrix is taken for [0,1] using as follows:

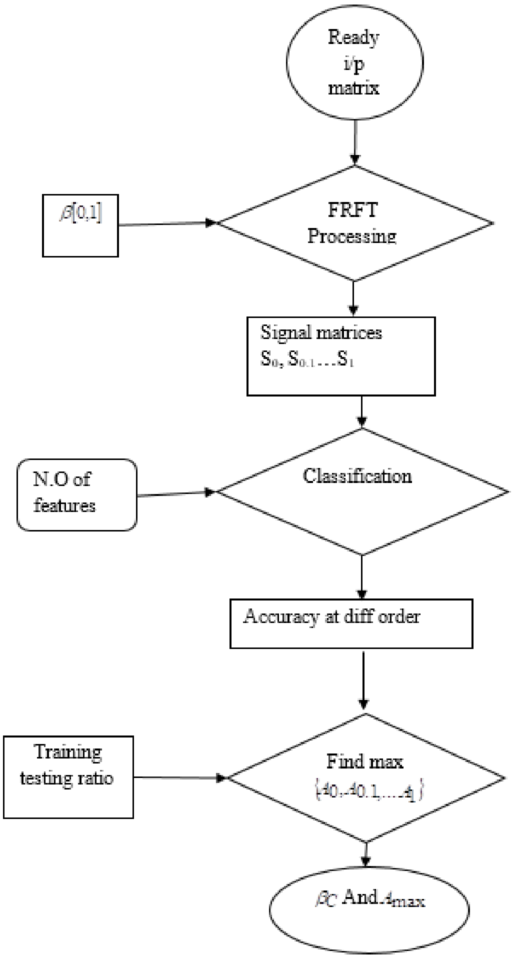

Figure 3. Flow chart of proposed Fourier transforms

The PQD based Fourier transform analyze the sag, notch, harmonics is shown in Figure 4.

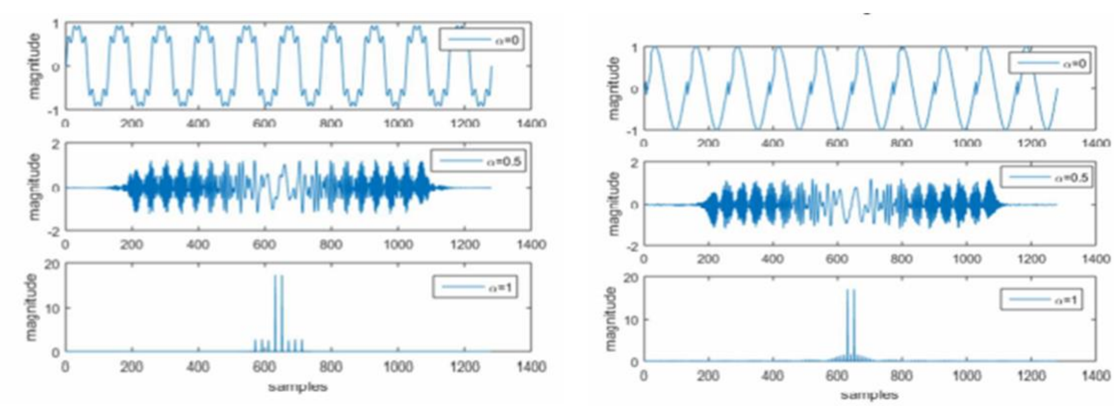

Figure 4. Sag, Harmonics, Notch of PQD system

3. Conclusion

The proposed Fourier transform is greatly helped in various domains like power distribution system, wireless, signal processing, mechanical and industrial application. In power system proposed method easily analyzes the fault, harmonics and disturbance. In wireless system they identify the noise and calculating the losses in easier way.

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