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13. Fundamental Results of C-L Transform

S.B. Chavhan
Assistant Professor and Head Department of Mathematics, Digambarrao Bindu College Bhokar.
N.S. Jadhav
Assistant Professor and Head Department of Mathematics, Madhavrao Patil Mahavidyalaya Palam.

Abstract

The Integral transform is a useful tool for optical analysis and signal processing. In this paper we have defined C-L transform and have also proved some fundamental results for this transform.

Keywords: Integral transform, Fractional Hartley Transform, C-L transform, canonical transform, canonical cosine and sine transforms, Fourier transform, fractional Fourier transform, Laplace transform, testing function space. Discrete Fractional Fourier Transform

Introduction

The Fourier analysis is undoubtedly the one of the most valuable and powerful tools in signal processing, image processing and many other branches of engineering sciences [4],[5],[11]the fractional Fourier transform, a special case of linear canonical transform is studied through different analysis .Almeida[1],[2].had introduced it and proved many of its properties . The fractional Fourier transform is a generalization of classical Fourier transform, which is introduce from the mathematical aspect by Namias at first and has many applications in optics quickly[10]. The definition of Laplace transform with parameter p of $f(x)$ denoted by

$$L[f(x)]=F(p)$$

1. $$L[f(x)]=\int_0^\infty e^{-px}f(x)$$

And definition of canonical transform with parameter s of $f(t)$ denoted by

$$\{CT\,f(t)\}(s)=\frac{1}{\sqrt{2\pi ib}}e^{\frac{i}{2}\left(\frac{d}{b}\right)s^2}\int_{-\infty}^{\infty}e^{-i\left(\frac{s}{b}\right)t}e^{\frac{i}{2}\left(\frac{a}{b}\right)t^2}f(t)$$

The definition of C-L transform is given in section 2. Some Fundamental results related to definitionof C-L transform as seperability theorem, scaling theorem and addition theorem are