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CANONICAL-LAPLACE TRANSFORM AND THEIR UNITARY REPRESENTATIONS

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ABSTRACT

Thelinear canonical transform is a useful tool for optical analysis and signal processing. In this paper we have defined canonical-Laplace transform and have also established some results for this transform.

Index Terms*: *Canonical Transform, Fourier Transform, Fractional Fourier Transform, Laplace Transform, Testing Function Space.

I 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 , the fractional Fourier transform, a special case of linear canonical transform is studied through different analysis .Almeida 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. The definition of Laplace transform with parameter p of $f(x)$ denoted by $L[f(x)]=F(p)$

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

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

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