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Linear canonical Hankel domain based Stockwell transform and associated Heisenberg's uncertainty principle

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Abstract

Linear canonical Hankel domain based Stockwell transform (LCHST) is the generalization of Hankel-Stockwell transform. In this paper, we propose the definition of LCHST and then obtain the classical results associated with the proposed transform. The crux of the paper lies in proving a sharp version of Heisenberg's uncertainty principle for LCHST.

1 Introduction

During the last few decades many methods for determining local spectra of non-stationary signals like seismic, genomic, electrocardiograms and speech signals have been established. As the Fourier transform gives only frequency component, new transformations were introduced for time-frequency representation. The important ones include short-time Fourier transform, wavelet transform, linear canonical transform, Stockwell transform and many more. Stockwell transform provides much information about the spectra of signals and has found wider applications in signal and image processing [23–25].

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