



Inequalities and uncertainty principles in the framework of convolution-based windowed free metaplectic transform

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Abstract

The convolution-based windowed free metaplectic transform (CWFMT) is a novel time-frequency analysis tool. In this paper, we first develop the relationship of the CWFMT with the Fourier transform (FT), the Short-time Fourier transform (STFT) and the free metaplectic transform (FMT). Second, we establish inequalities associated with the CWFMT including Pitt's inequality and the Hausdorff–Young inequality. Finally, we demonstrate some new results concerning several generalizations of the uncertainty principles associated with the proposed transform.

Keywords Free metaplectic transform · Convolution-based windowed free metaplectic transform · Pitt's inequality · Logarithmic Sobolev-type uncertainty principle

1 Introduction

The free metaplectic transform (FMT) is a generalized integral transform that, by varying its parameters, reduces to special cases such as the Fourier transform, the fractional Fourier transform, the Fresnel transform, and even basic operations involving phase factor multiplication [1–3]. The FMT involves a general $2N \times 2N$

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