ORIGINAL RESEARCH PAPER

The 2-D Hyper-complex Gabor quadratic-phase Fourier transform and uncertainty principles

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Abstract

In this paper, we present a novel integral transform known as the 2-D Hyper-complex (quaternion) Gabor quadratic-phase Fourier transform (Q-GQPFT), which is embodiment of several well known signal processing tools. We first define the 2-D Hyper-complex(quaternion) quadratic-phase Fourier transform (Q-QPFT) and then we propose the definition of novel Q-GQPFT, which is a modified version of the classical windowed quadratic-phase Fourier transform to quaternion-valued signals and we study various properties of the proposed Q-GQPFT, including Moyal's formula, reconstruction formula, isometry and reproducing kernel formula. We also establish the Heisenberg and logarithmic uncertainty inequalities for the Q-GQPFT.

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