GENERALIZATION OF TIME–FREQUENCY SIGNAL REPRESENTATIONS TO JOINT FRACTIONAL FOURIER DOMAINS (WedAmOR10)

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Abstract :

The 2–D signal representations of variables rather than time and frequency have been proposed based on either Hermitian or unitary operators. As an alternative to the theoretical derivations based on operators, we propose a joint fractional domain signal representation (JFSR) based on an intuitive understanding from a time–frequency distribution constructing a 2–D function which designates the joint time and frequency content of signals. The JFSR of a signal is so designed that its projections on to the defining joint fractional Fourier domains give the modulus square of the fractional Fourier transform of the signal at the corresponding orders. We derive properties of the JFSR including its relations to quadratic time–frequency representations and fractional Fourier transformations. We present a fast algorithm to compute radial slices of the JFSR.

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