

Logarithmic uncertainty principle, convolution theorem related to continuous fractional wavelet transform and its properties on a generalized sobolev space

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Abstract

The continuous fractional wavelet transform (CFrWT) is a nontrivial generalization of the classical wavelet transform (WT) in the fractional Fourier transform (FrFT) domain. Firstly, the RiemannLebesgue lemma for the FrFT is derived, and secondly, the CFrWT in terms of the FrFT is introduced. Based on the CFrWT, a different proof of the inner product relation and the inversion formula of the CFrWT are provided. Thereafter, a logarithmic uncertainty relation for the CFrWT is investigated and the convolution theorem related to the CFrWT is established using the convolution of the FrFT. The CFrWT on a generalized Sobolev space is introduced and its important properties are presented..

Keywords: Inner product relation; fractional convolution; continuous fractional wavelet transform

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