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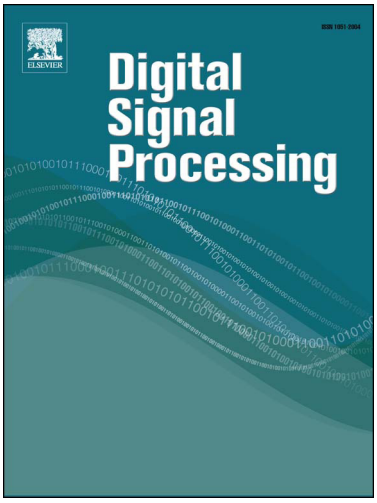


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# Periodically Nonuniform Sampling and Averaging of Signals in Multiresolution Subspaces Associated with the Fractional Wavelet Transform

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**Abstract**

Periodically nonuniform sampling is one of the most fundamental theories in the signal processing community. Several sampling theorems, which aid in the reconstruction of periodically nonuniform sampled signals in the fractional Fourier transform (FrFT) and the linear canonical transform (LCT) domain, have been proposed in the existing literature. However, we are given only finite number of samples in practice. Therefore, these theorems may not be suitable for the perfect reconstruction of a signal because of the slow decay of synthesizing functions. Focusing on this issue, we first investigate the reconstruction of a periodically nonuniform sampled signal in multiresolution subspaces associated with the recently-proposed fractional wavelet transform (FrWT). By means of perfect reconstruction (PR) filter banks associated with the FrFT, we derive the expressions of the synthesizing functions which can be guaranteed to be compactly supported, under a mild restriction that the number of channels is constrained by the support of scaling function. In

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