

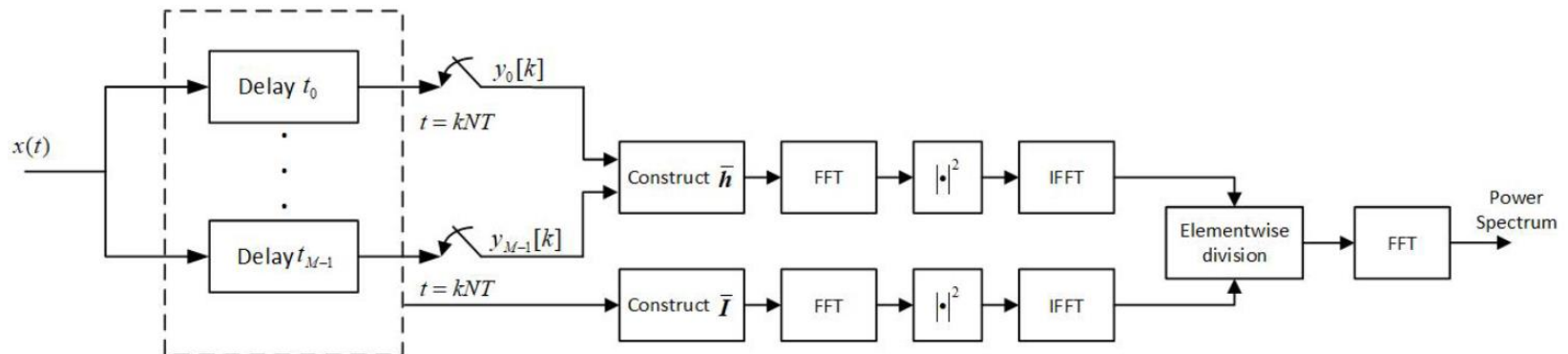
Sub-Nyquist Sampling-Based Wideband Spectrum Sensing: A Compressed Power Spectrum Estimation Approach

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Problems & Ideas

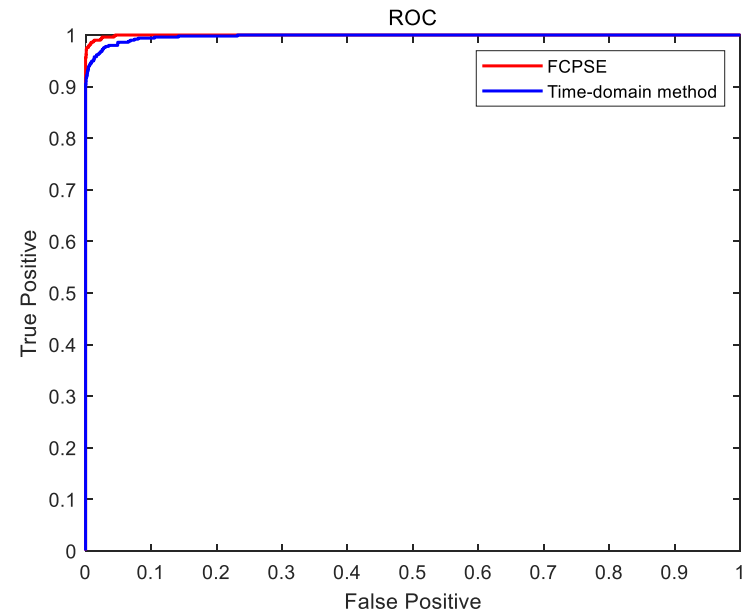
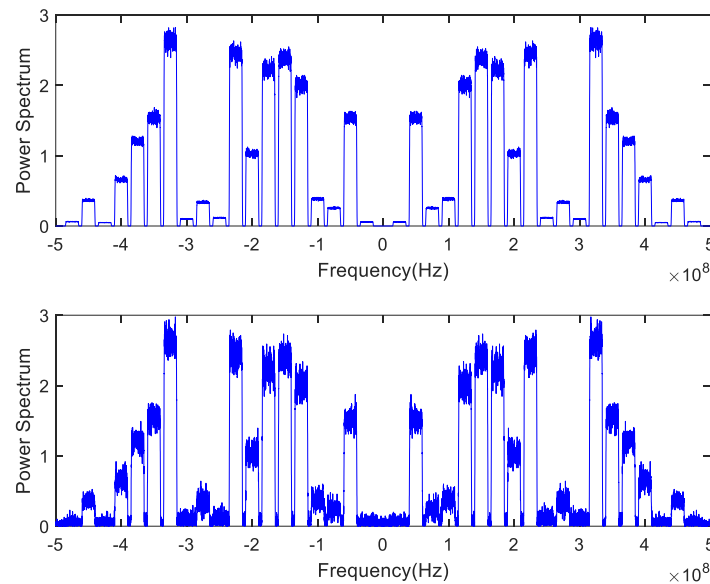
- Problems of existing sub-Nyquist sampling-based wideband spectrum sensing methods:
 - Compressed sensing-based approaches have high computational complexities and require high SNR.
 - Compressive covariance sensing-based methods directly reconstruct the power spectrum with moderate SNR and are computationally easier.
- Ideas: A new compressive covariance sensing-based method which exploits the inherent sampling structure of the multi-coset sampling architecture.



Based on the block diagram of the fast compressed power spectrum estimation, an amiable relationship between the autocorrelation sequence and the sub-Nyquist samples can be established.

Main Contributions

- Contributions:
 - An amiable relationship between the autocorrelation sequence and the sub-Nyquist samples is established to exploit the inherent sampling structure of the multi-coset sampling architecture ;
 - A fast compressed power spectrum estimation method is proposed, whose primary computational task consists of fast Fourier transform (FFT).



Left: From top to bottom, Ground truth and estimated power spectrum reconstruction under the non-sparse situation.

Right: The ROC of our proposed method and the time-domain method. The run times of our proposed method and the time-domain method are respectively given as 0.022s, 0.061s, and the corresponding mean square error (MSE) are respectively given as 0.578, 0.604.