A STUDY ON MIXING SEQUENCES IN MODULATED WIDEBAND CONVERTERS

Jehyuk Jang, Nam Yul Yu, and Heung-No Lee
Gwangju Institute of Science and Technology (GIST), South Korea

1. Background

The modulated wideband converter (MWC) is a sub-Nyquist sampler exploiting the compressed sensing theory, which employs multiple number of periodic random sequences.

We scope on choosing the periodic random sequences.

The sequences should be well chosen for the lossless sampling.

The robustness against noise in the lossless sampling is also influenced by the type of sequences.

We provide conditions for the best sequences!

2. Question?

Q. What kinds of sequences are
1. Qualified and
2. Preferred
for the base sequence of RPFMWC?

Find conditions for:

i. The qualified base sequence: necessary for the lossless sampling of the RPFMWC.

ii. The more preferred base sequence: more robust against noise for the lossless sampling.

3. Existing Results

I. The Qualified sequences:

If the discrete Fourier transform (DFT) of a base sequence have uniform magnitudes, the RPFMWC can achieve the lossless sampling.

[ref: L. Gan 2013]

- The sufficient condition is quiet strict.
- More general conditions are needed.

II. The Preferred sequences:

No research efforts have been reported.

4. Simulations

The Spectral instability well evaluates the base sequences!

5. Conclusions

The modulated wideband converter (MWC) is a sub-Nyquist sampler exploiting multiple number of periodic random sequences \( p_i(t) \).

We scope on choosing the sequences \( p_i(t) \).

The random partial Fourier MWC (RPFMWC): A MWC, whose sequences \( p_i(t) \) are random cyclic shifts of a base sequence.

We scope on choosing the base sequence.

We provide conditions for the best sequences!