

PhD Oral Defense

Date: 28 December 2020 (Monday)

Time: 4:00pm

Thesis Title

Periodic Nonuniform Sampling and Reconstruction of Modulated Signals



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Abstract

The sampling and reconstruction of continuous-time signals are commonly required in many areas, including wireless communications. The Nyquist sampling theorem states that any bandlimited signal can be uniquely recovered from its uniform samples obtained with a sampling frequency which is at least twice the highest frequency component in the signal. While sampling a bandpass signal at the Nyquist rate will usually result in a higher rate than necessary, periodic nonuniform sampling (PNS) can address this issue. PNS involves N undersampled sequences of the signal with different time offsets taken at the same sampling rate. The total sampling rate of PNS is defined as the sum of these N undersampling rates. The order of PNS, namely N , should be small enough that the total sampling rate is lower than the Nyquist rate. However, the corresponding sampling and reconstruction systems are generally too complicated for practical implementation. In this thesis, we study reconstruction methods by applying the PNS of bandlimited signals at a minimal sampling rate.