

Linear Stable Sampling Rate Results for Generalized Sampling in Connection with Multidimensional Representation Systems

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Abstract

Reconstructions of objects from finitely many Fourier samples can be obtained by considering a truncated Fourier series. But a truncated Fourier series is rife with undesired properties (slow convergence and Gibbs effects). Therefore, we consider reconstructions by using other function systems, e.g. wavelets. For that reason, we introduce “Generalized Sampling”, a new method developed by Ben Adcock and Anders Hansen, that allows a reconstruction by using any basis by choice. “Stable” and “quasi-optimal” reconstructions can be obtained by investigating the “stable sampling rate”. The latter determines the number of samples that are needed in order to guarantee a successful reconstruction. In this work we are mainly interested in dimension two. Our results will show the linearity of the stable sampling rate for many common 2D wavelets and give a criteria for arbitrary 2D wavelet systems. Also considerations that shall lead to shearlet systems will be provided.