PIMS / AMI Seminar / Colloquium

Thursday, April 5, 2012
3:30 p.m.
CAB 657

"Extremely local wavelet bases in several dimensions"

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Abstract

Wavelet bases are thought to provide, for functions with local singularities in arbitrary dimension, a representation that is optimally local in space and frequency. In reality, even in moderate dimension, standard wavelet constructions fail miserably. For example, when using the tensor-product of Daubechies' wavelets with 4 vanishing moments, a single local singularity in 5D is represented by about 500,000 non-zero coefficients in each scale, and in 10D that number reaches 300,000,000,000. That means that such constructs are, in reality, non local at all.

We provide a theory and corresponding constructions of wavelet bases that are truly local in space and frequency in any spatial dimension. The theory begins with the fundamental principles of frame theory that were developed years ago by myself, Zuowei Shen, Bin Han and others, and continues with more recent developments. The resulting constructs are really local: a system of ours that performs in frequency on par with or better than the above Daubechies' system yields at each scale 5 non-zero coefficients for each local singularity, and this number is independent of the spatial dimension.

The talk should be accessible to general audience in analysis/applied math. It is based on joint work with Youngmi Hur (JHU).

Refreshments will be served in CAB 649 at 3:00 p.m.