Wavelet Expansions on Spaces of Homogeneous Type
Han Yongsheng
Auburn University

Abstract: Wavelet expansion, as a substitute of the Fourier series and the Fourier transform, appeared in 1984. Wavelet analysis provides a simpler and more efficient way to analyze functions and distributions that have been studied by use of Fourier series and integrals. However, Fourier analysis still plays a key role in constructing the orthonormal bases of wavelets.

One wonders if wavelet expansions can be achieved in the general context of space of homogeneous type where we do not have Fourier transformation. Spaces of homogeneous type were introduced by Coifman and Weiss in the 1970s. This talk is devoted to wavelet analysis on spaces of homogeneous type. We will build some Calderón identities and use them to write some wavelet expansions of functions and distributions on a set of homogeneous type. These wavelet expansions will reflect the regularity of functions and distributions as in the standard case.

It is not known how to establish orthonormal wavelets on general spaces of homogeneous type. But this discrete version of wavelet expansions provides a new tool at our command to carry out many important results on $\mathbb{R}^n$ to spaces of homogeneous type.