

Amplitude and sign decompositions by complex wavelets and applications to image analysis

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Complex wavelet transforms are essential tools for signal and image processing. The advantage of complex wavelets over real-valued wavelets is that they yield a natural decomposition of the wavelet coefficient functions into a slowly varying envelope, the amplitude, and an oscillatory part, the sign (or phase).

In the talk we study the construction of multivariate complex wavelets for amplitude and sign decompositions and investigate the use of such decompositions for image analysis. We on the one hand exploit the connection between complex wavelet amplitude (more precisely curvelet or shearlet amplitude) and the wavefront set to derive and to analyze an algorithm for the separation of edges in x-ray images. On the other hand, we investigate how the sign (or phase) of complex wavelet coefficients can be used for signal and image analysis.