On the design of multi-dimensional compactly supported Parseval framelets
with directional characteristics

Abstract: We propose a new method for the construction of multi-dimensional, wavelet-like families of affine frames, commonly referred to as framelets, with specific directional characteristics, small and compact support in space, directional vanishing moments (DVM), and axial symmetries or anti-symmetries. The framelets we construct arise from readily available refinable functions. The filters defining these framelets have few non-zero coefficients, custom-selected orientations and can act as finite difference operators.