Quarkonial decompositions on domains

Alexander Sieber, Philipps-Universität Marburg

This poster is concerned with new discretization methods for the numerical treatment of elliptic partial differential equations. We derive an adaptive frame scheme that is based on quarkonial decompositions. These new frames are constructed from a finite set of functions by translation, dilation and multiplication by monomials. By means of nonoverlapping domain decompositions, we establish quarkonial frames on domains that can be decomposed into the union of parametric images of unit cubes. We also show that these new representation systems constitute stable frames in scales of Sobolev spaces. The construction is performed in such a way that, similar to the wavelet setting, the frame elements, the so-called quarklets, possess a certain amount of vanishing moments. This enables us to generalize the basic building blocks of adaptive wavelet algorithms to the quarklet case. The applicability of the new approach is demonstrated by numerical experiments for the Poisson equation on L-shaped domains.
This is joint work with S. Dahlke, U. Friedrich, P. Keding and T. Raasch.