Minisymposium 13 - Approximationsmethoden für Probleme auf der Sphäre

Convolution structures and polynomial approximation on the sphere

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We introduce convolution structures on $\mathbb{N}_0$ and on the intervall $[-1, 1]$ established by so-called product formulas for orthogonal polynomials. After that we will show how to use these structures in order to construct good kernels. Due to the polynomial preproduction property of the associated approximation process the de la Vallée Poussin kernel for Jacobi expansions is of special interest. This operator is then used to approximate functions f defined on the unit sphere $S^d \subset \mathbb{R}^{d+1}$, using samples of f at scattered sites. We are going to show how to obtain so-called Marcinkiewicz-Zygmund inequalities and establish concrete error estimates. Finally we show how to use these results in order to derive positive quadrature rules on S^d of high accuracy and based on function values at scattered point on S^d.