

## Approximation with brushlet systems

We consider an orthonormal basis for  $L_2(\mathbf{R})$  consisting of functions that are well localized in the spatial domain and have compact support in the frequency domain. The construction is based on smooth local cosine bases and is inspired by Meyer and Coifman's brushlets, which are local exponentials in the frequency domain. For brushlet bases associated with an exponential-type partition of the frequency axis, we show that the system constitutes an unconditional basis for  $L_p(\mathbf{R})$ ,  $1 < p < \infty$ ,  $B_q^s(L_p(\mathbf{R}))$ ,  $1 < p, q < \infty$ ,  $s > 0$ , and that the norm in these spaces can be expressed by the expansion coefficients. In  $L_p(\mathbf{R})$ , we construct greedy brushlet-type bases and derive Jackson and Bernstein inequalities. Finally, we investigate a natural bivariate extension leading to ridgelet-type bases for  $L_2(\mathbf{R})$ .