

Weighted Spaces of Distributions on the Interval and Ball

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The Littlewood-Paley theory is extended to weighted spaces of distributions on $[-1, 1]$ with Jacobi weights

$$w(t) = (1 - t)^\alpha(1 + t)^\beta$$

and on the unit ball B^d in \mathbb{R}^d with weights

$$W_\mu(x) = (1 - |x|^2)^{\mu-1/2}, \quad \mu \geq 0.$$

Almost exponentially localized polynomial elements (needlets) $\{\varphi_\xi\}$, $\{\psi_\xi\}$ are constructed and, in complete analogy with the classical case on \mathbb{R}^n , it is shown that weighted Triebel-Lizorkin and Besov spaces can be characterized by the size of the needlet coefficients $\{\langle f, \varphi_\xi \rangle\}$ in respective sequence spaces.