WEIGHTED ESTIMATES FOR DYADIC PARAPRODUCTS AND t-HAAR MULTIPLIERS WITH COMPLEXITY (m, n)

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Abstract: We extend the definitions of dyadic paraproduct and t-Haar multipliers to dyadic operators that depend on the complexity (m, n), for m and n natural numbers. We use the ideas developed by Nazarov and Volberg to prove that the weighted $L^2(w)$-norm of a paraproduct with complexity (m, n), associated to a function $b \in BMO^d$, depends linearly on the A_2^d-characteristic of the weight w, linearly on the BMO^d-norm of b, and polynomially on the complexity. This argument provides a new proof of the linear bound for the dyadic paraproduct due to Beznosova. We also prove that the L^2-norm of a t-Haar multiplier for any $t \in \mathbb{R}$ and weight w is a multiple of the square root of the C_{2t}^d-characteristic of w times the square root of the A_2^d-characteristic of w^{2t}, and is polynomial in the complexity.

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