

## WEIGHTED INEQUALITIES FOR MULTIVARIABLE DYADIC PARAPRODUCTS

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*Abstract*

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Using Wilson's Haar basis in  $\mathbb{R}^n$ , which is different than the usual tensor product Haar functions, we define its associated dyadic paraproduct in  $\mathbb{R}^n$ . We can then extend "trivially" Beznosova's Bellman function proof of the linear bound in  $L^2(w)$  with respect to  $[w]_{A_2}$  for the 1-dimensional dyadic paraproduct. Here trivial means that each piece of the argument that had a Bellman function proof has an  $n$ -dimensional counterpart that holds with the same Bellman function. The lemma that allows for this painless extension we call the good Bellman function Lemma. Furthermore the argument allows to obtain dimensionless bounds in the anisotropic case.

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*Key words*. Operator-weighted inequalities, multivariable dyadic paraproduct, anisotropic  $A_p$ -weights.