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Weighted Inequalities for Conmutators of One-sided Singular Integrals

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ABSTRACT

We prove weighted inequalities for conmutators of one-sided singular integrals (given by a Calderón-Zygmund kernel with support in $(-\infty, 0)$) with BMO functions. We give the one-sided version of the results in [C. Pérez, Sharp estimates for conmutators of singular integrals via iterations of the Hardy-Littlewood maximal function, The Journal of Fourier Analysis and Applications, vol. 3 (6),1997, pages 743-756] and [C. Pérez, Endpoint estimates for conmutators of singular integral operators, Journal of Functional Analysis, vol 128 (1), 1995, pages 163-185]. We improve these results for one-sided singular integrals by putting in the right hand side of the inequalities a smaller operator and a wider class of weights. One of our main results is:

Theorem 1: Let $0 < p < \infty$, $k = 0, 1, \ldots$, $w \in A_\infty^+$ and $b \in BMO$. Let K be a Calderón-Zygmund kernel with support in $(-\infty, 0)$ and let $T_b^{+,k}$ defined (in the principal value sense) by

$$T_b^{+,k} f(x) = \int_x^\infty (b(x) - b(y))^k K(x-y) f(y) dy.$$

Then there exists C such that

$$\int_{\mathbb{R}} |T_b^{+,k} f|^p w \leq C ||b||_{BMO}^{kp} \int_{\mathbb{R}} \left((M^+)^{k+1} f\right)^p w,$$

for all f such that the left hand side is finite.

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