

Certain bilinear operators on power-weighted Morrey spaces

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Abstract. In this paper, we consider the boundedness properties of two classes of bilinear operators on Morrey spaces with power weights. The first operator is the bilinear maximal operator $T^*(f, g)(x) = \sup_j |T_j(f, g)(x)|$, where $T_j(f, g)$ is a bilinear operator with the kernel K_j satisfying the uniform estimate

$$|K_j(x, y_1, y_2)| \leq \frac{1}{(|x - y_1| + |x - y_2|)^{2n}},$$

where $x, y_1, y_2 \in \mathbb{R}^n$ with $x \neq y_k$ for some $k \in \{1, 2\}$. The second operator is $\mathcal{T}(f, g)$, which, being a bilinear operator, satisfies

$$|\mathcal{T}(f, g)(x)| \leq \int_{\mathbb{R}^n} \frac{|f(x - ty)g(x - y)|}{|y|^n} dy$$

for $x \in \mathbb{R}^n$ and $0 < |t| \leq 1$ such that $0 \notin \text{supp}(f(x - t \cdot)) \cap \text{supp}(g(x + \cdot))$. We obtain that these two operators are bounded operators from the product weighted Morrey spaces $L^{q, \lambda_1}(\mathbb{R}^n, |x|^\beta dx) \times L^{r, \lambda_2}(\mathbb{R}^n, |x|^\tau dx)$ to the weighted Morrey spaces $L^{p, \lambda}(\mathbb{R}^n, |x|^\alpha dx)$ with the assumption of the boundedness on Lebesgue spaces. As applications, we yield that many well-known bilinear operators are bounded on power-weighted Morrey spaces.

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