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Boundedness Criteria for the Hardy Operator in Weighted $L^{p(\cdot)}(0, l)$ Space

Equivalent conditions are proved for the Hardy type weighted inequality

$$\left\| W(\cdot)^{-1} \sigma(\cdot)^{\frac{1}{p(\cdot)}} \int_0^x f(t) dt \right\|_{L^{p(\cdot)}(0, l)} \leq C \left\| \omega(\cdot)^{\frac{1}{p(\cdot)}} f \right\|_{L^{p(\cdot)}(0, l)}, \quad f \geq 0$$

to be fulfilled in the norms of a Lebesgue space with variable exponent $L^{p(\cdot)}(0, l)$.
It is assumed that the function $p(\cdot)$ is a monotone function.

Keywords: Hardy operator, Hardy type inequality, variable exponent, weighted inequality, necessary and sufficient condition.

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