Fredholm criteria for singular integral operators with continuous coefficients on variable Lebesgue spaces

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Let $\mathcal{B}_M(\mathbb{R})$ stand for the set of all variable exponents $p(\cdot) : \mathbb{R} \to [1, \infty)$ such that

$$\operatorname*{ess\,inf}_{x\in\mathbb{R}} p(x) > 1, \qquad \operatorname*{ess\,sup}_{x\in\mathbb{R}} p(x) < \infty,$$

and the Hardy-Littlewood maximal operator M defined by

$$(Mf)(x) := \sup_{I\ni x} \frac{1}{|I|} \int_I |f(t)| \, dt,$$

is bounded on the variable Lebesgue space $L^{p(\cdot)}(\mathbb{R})$. We extend the Fredholm criteria for singular integral operators with continuous coefficients on the Lebesgue space $L^p(\mathbb{R})$, $p \in (1, \infty)$, obtained by Israel Gohberg and Naum Krupnik in the 1970s, to the setting of variable Lebesgue spaces $L^{p(\cdot)}(\mathbb{R})$ with $p(\cdot) \in \mathcal{B}_M(\mathbb{R})$.

[1] Gohberg, I. and Krupnik, N., *One-dimensional linear integral equations. I. Introduction.* Birkhäuser Verlag, Basel, 1992.