Maximal Function Characterizations of Hardy Spaces Associated with Magnetic Schrödinger Operators

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Abstract. Let $A := -(\nabla - i\vec{a}) \cdot (\nabla - i\vec{a}) + V$ be a magnetic Schrödinger operator on $L^2(\mathbb{R}^n)$, $n \geq 2$, where $\vec{a} := (a_1, \cdots, a_n) \in L^2_{\mathrm{loc}}(\mathbb{R}^n, \mathbb{R}^n)$ and $0 \leq V \in L^1_{\mathrm{loc}}(\mathbb{R}^n)$. In this talk, we establish the equivalent characterizations of the Hardy space $H^p_A(\mathbb{R}^n)$ for $p \in (0, 1]$, defined by the Lusin area function associated with A, in terms of the radial maximal functions and the non-tangential maximal functions associated with $\{e^{-t^2 A}\}_{t>0}$ and $\{e^{-t\sqrt{A}}\}_{t>0}$, respectively. The boundedness of the Riesz transforms $L_k A^{-\frac{1}{2}}$, $k \in \{1, \cdots, n\}$, from $H^p_A(\mathbb{R}^n)$ to $L^p(\mathbb{R}^n)$ is also presented, where L_k is the closure of $\frac{\partial}{\partial x_k} - ia_k$ in $L^2(\mathbb{R}^n)$ and $p \in (0, 1]$.