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Convolution Operators on Matrix Weighted Variable Lebesgue Spaces

The theory of matrix \mathcal{A}_p weights has attracted considerable attention, beginning with the work of Nazarov, Treil, and Volberg in the 1990s. In this talk, we describe our work to extend this theory to the variable Lebesgue spaces. Generalizing matrix \mathcal{A}_p to the variable exponent setting plays a crucial role.

David Cruz-Uribe, Kabe Moen, and Scott Rodney proved that given a matrix weight $W \in \mathcal{A}_p$ and a nice function $\phi \in C_c^\infty(\Omega)$, the convolution operator $\mathbf{f} \mapsto \phi * \mathbf{f}$ is bounded and approximate identities defined using ϕ converge. We extend the convergence of this convolution operator to matrix weighted variable Lebesgue spaces. As an application of our work, we prove a version of the classical H=W theorem for matrix weighted, variable exponent Sobolev spaces.