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H = W in matrix weighted spaces, with applications to mappings of finite distortion.

Let W be a matrix weight in the matrix A_p class, and let $v = |W|_{op}$. Define the matrix Sobolev space $\mathcal{W}_W^{1,p}$ to be the set of functions $f \in W_{loc}^{1,1}$ such that $f \in L^p(v)$ and $\nabla f \in L^p(W)$. We prove that the classical $H = W$ theorem of Meyers and Serrin, that smooth functions are dense, is true in this setting. As an application we prove partial regularity results for mappings of finite distortion. (Received January 17, 2015)