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Changzhong Zhu* (chang@dms.umontreal.ca), Dept. of Mathematics and Statistics, University of Montreal, Montreal, QC H3C 3J7, Canada. *Approximation In Weighted Hardy Spaces.*

The weighted Hardy space over the unit disc D with the weight function w satisfying Muckenhoupt's condition (A^p) ($p > 1$), which we denote by $H_w^p(D)$, was first mentioned by J. Garcia-Cuerva in 1979 but no details were given. In this paper we study the properties of the space and some related approximation problems. A function $f(z)$ analytic in D is said to belong to $H_w^p(D)$ if

$$\sup_{r < 1} \int_{-\pi}^{\pi} |f(re^{i\theta})|^p w(\theta) d\theta < +\infty.$$

By the properties of the (A^p) weights, first we obtain some results showing the closed relation between $H_w^p(D)$ and the classical Hardy space $H^p(D)$ ($w \equiv 1$). In particular, we obtain the Cauchy-type integral representation and the norm estimate of elements of the space. We then consider two special systems of rational functions which are incomplete and biorthogonal in $H_w^p(D)$, study related interpolation and moment problems, and obtain the biorthogonal expansions with respect to the subspaces spanned by these systems. Finally, we study the approximation in $H_w^p(D)$ by a complete system of rational functions, and obtain an estimate for the order of approximation. (Received February 21, 2006)