1086-43-439   **Yayuan Xiao*** (`xiao@math.wayne.edu`), Detroit, MI 48201. *Weighted multi-parameter Hardy spaces associated with Zygmund dilations.*

Among the multi-parameter analysis, the Zygmund dilations are the simplest after pure product space dilations. We established the weighted multi-parmeter Hardy spaces $H_{\mathcal{Z}}^p(\omega)$ associated with Zygmund dilations for $0 < p < \infty$ and $\omega \in A_\infty(\mathcal{Z}) = \cup_{1 \leq p < \infty} A_p$, the weighted class associated with the Zygmund dilation. And we proved the $(H_{\mathcal{Z}}^p(\omega), H_{\mathcal{Z}}^p(\omega))(0 < p < \infty)$ boundedness and the $(H_{\mathcal{Z}}^p(\omega), L_{\mathcal{Z}}^p(\omega))(0 < p \leq 1)$ boundedness of the Ricci-Stein multi-parameter singular integral operators for $w \in A_\infty(\mathcal{Z})$. Moreover, we characterized the dual spaces of $H_{\mathcal{Z}}^p(\omega)$, that is, $(H_{\mathcal{Z}}^p(\omega))^* = CMO_{\mathcal{Z}}(\omega)$ for all $0 < p \leq 1$ and $\omega \in A_\infty(\mathcal{Z})$. Such Carleson measure spaces plays the same role as the John-Nirenberg BMO spaces in the duality $H^1(\mathbb{R}^n) - BMO(\mathbb{R}^n)$ in the non-weighted one-parameter setting when $p = 1$ and $\omega = 1$. Our argument is based on the discrete Calderón reproducing formula and Littlewood-Paley-Stein theory associated with the Zygmund dilations. (Received September 01, 2012)