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**Jarod Hart\*** (jarod.hart@wayne.edu) and **Alessandro Monguzzi**  
(alessandro.monguzzi@unimi.it). *A Biparameter Tb Theorem with an Application to  
Holomorphic Extension in  $\mathbb{C}^2$ .*

In this joint work with Alessandro Monguzzi, we prove a new Tb type boundedness criterion for biparameter Calderón-Zygmund operators. We use this Tb theorem to prove  $L^p$  bounds for a biparameter Cauchy integral transform defined on certain Lipschitz surfaces in  $\mathbb{C}^2$  when  $1 < p < \infty$ . In this setting, the biparameter Cauchy integral transform plays the role that the biparameter Hilbert transform on the product upper half plane in  $\mathbb{C}^2$ . Consequently, we prove the following Hilbert-Riemann holomorphic extension result for appropriate Lipschitz surfaces  $\Gamma \subset \mathbb{C}^2$ : given  $1 < p < \infty$  and an  $L^p(\Gamma)$  function  $g$  defined on  $\Gamma \subset \mathbb{C}^2$ , we define a function  $G$  on  $\mathbb{C}^2$  that is holomorphic away from  $\Gamma$  and agrees with  $g$  on  $\Gamma$ , in an appropriate limiting sense. Furthermore,  $G(w) \rightarrow g(z)$  almost everywhere on  $\Gamma$  and in  $L^p(\Gamma)$  as  $w \in \mathbb{C}^2$  approaches  $z \in \Gamma$ . (Received August 14, 2014)