1056-65-1021 **Malena Espanol*** (mespanol@caltech.edu), Graduate Aeronautical Laboratories, California Institute of Technology, 1200 E. California Blvd. MC: 205-45, Pasadena, CA 91125, and **Misha Kilmer**. *A Multilevel, Modified Regularized Total Least Norm Approach to Signal Deblurring.*

In this talk, we present a multilevel method for discrete ill-posed problems formulated as total least norm problems. We will focus on the signal deblurring problem where both the blurring operator and the blurred signal contain noise. Regularized total least norm (R-TLN) approaches which have been developed to solve this problem require the minimization of a functional with respect to the unknown perturbation in the blurring operator and the desired image. Much of the work to date in solving R-TLN has required the perturbation operator to have special structure (e.g. sparsity structure or Toeplitz type structure) in order to make the minimization problem more computationally tractable. Our goal is to gain additional efficiency by means of a multilevel approach. Therefore, we present a multilevel method that uses the Haar wavelets as restriction and prolongation operators. We show that the choice of the Haar wavelet operator has the advantage of preserving matrix structure, such as Toeplitz, among grids, and we discuss how this can be incorporated into intermediate R-TLN problems on each level. Finally, we present results that indicate the promise of this approach on deblurring signals with edges. (Received September 20, 2009)