1062-65-254 **Rosemary A Renaut*** (renaut@asu.edu), School of Mathematical and Statistical, Sciences, Arizona State University, 871804, Tempe, AZ 85287. *Multisplitting for Solving the Regularized Least Squares Problem with Krylov Subspace Recycling.* Preliminary report.

We consider a general approach for the solution of ill-posed and overdetermined systems of equations using the method of multi-splitting which was introduced for linear systems of equations in 1985 by O'Leary and White and extended for least squares problems by Renaut in 1995. It is easily extended for Tikhonov regularized least squares, by applying the relevant decomposition to the augmented functional. Convergence results for the least squares problem extend for the regularized case.

This work is novel in the context of least squares solvers and for general multisplitting. The use of Krylov subspace recycling for efficient solution of the local split problems, takes advantage of the fact that the local problems with fixed system but updated right hand side are solved multiple times throughout the global iteration to convergence. Updates of the underlying Krylov subspace for the multiple right hand side system improve the algorithm efficiency. The multisplitting algorithm allows different regularization operators and parameters for different domains.

Numerical validation is presented for the reconstruction of the Shepp-Logan phantom and a 1D restoration problem with variable noise in the signal. Using GPU's allows an efficient algorithm for image restoration. (Received August 10, 2010)