Meeting: 1003, Atlanta, Georgia, SS 36A, AMS-SIAM Special Session on Mathematical Image Processing, I

1003-49-1015 **Mila Nikolova*** (nikolova@cmla.ens-cachan.fr), CMLA (CNRS UMR 8536) - ENS de Cachan, 61 av. du President Wilson, Cachan, 94235. *Analysis of the recovery of edges in images and signals by minimizing nonconvex regularized least-squares.* Preliminary report.

We focus on the restoration of discrete signals and images using regularized least-squares. Our goal is to find the main features of the (local) minimizers of the objective function in connection with the shape of the regularization. This question is of paramount importance for a relevant choice of the regularization term. The main point of interest is to study how non-convex regularization entail an enhancement of edges while homogeneous regions are very smooth. We show that the differences between neighboring pixels in homogeneous regions are smaller than a small threshold while they are larger than a large threshold at edges. If the original signal or image is a scaled characteristic function of a subset, we show that the global minimizer is smooth if the contrast is low, whereas edges are correctly recovered for a higher contrast. This behavior is fundamentally different from the case of (edge-preserving) convex regularization. Our theoretical results are illustrated using numerical examples. (Received October 02, 2004)