Meeting: 1002, Pittsburgh, Pennsylvania, SS 15A, Special Session on PDE-Based Methods in Imaging and Vision

1002-62-58 **Hamid Krim*** (ahk@ncsu.edu), EGRC Building, Box 7914, NCSU, Raleigh, NC 27606, and **Elena Zhizhina** (ejj@iitp.ru), Moscow, Russia, Russia. *Nonlinear Energy Minimization in Signal/Image Analysis by Stochastic Differential Equations.*

Over the last decade and a half, an explosive number of nonlinear diffusion equations have been proposed in computer vision for signal/image filtering, segmentation and feature extraction. Recent attempts have sought a probabilistic interpretation to address convergence and sensitivity limitations. The intractability of the problem has, however, always led to many approximations. In this work, we view an image as a system of particles, and the pixels as diffusing particles as in statistical physics. Given an Energy Functional (or Hamiltonian as known in Physics), we construct a nonlinear diffusion equation (or the PDE of a Macro-state behavior) with its correspondingly exact Stochastic Differential Equation (SDE). The latter is implemented to minimize the Hamiltonian. This general formulation addresses any NL filtering problem for an arbitrary initial condition and almost surely guarantees a global minimum. Illustrative examples are provided and an improved performance is demonstrated. (Received August 15, 2004)