

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

1003-49-1374 **Kevin R Vixie*** (vixie@lanl.gov), T-7 Mathematical Modeling and Analysis, B-284,
Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 87545. *Exact solutions
for the L^1 TV functional.*

In this talk I present joint work with Selim Esedoglu in which we obtain characterizations of exact solutions to the L^1 total variation functional used in image denoising.

In contrast to the original Rudin-Osher-Fatemi (ROF) model:

$$F(u) \equiv \int |\nabla u| + \lambda \int |u - f|^2$$

the L^1 TV functional, is given (as the expected from the name) by:

$$F(u) \equiv \int |\nabla u| + \lambda \int |u - f|,$$

and has several appealing properties including contrast preservation as well as a closer relation to the underlying geometric analysis. One can prove nice properties like, for example, the fact that for $f =$ a characteristic function on a bounded set with smooth boundary, there is a λ^* such that for all $\lambda > \lambda^*$ the minimizing $u = f$.

I will present three results aimed at giving a more complete characterization of exact solutions to minimization problems in which f is a characteristic function. In particular, the results should be of interest to those interested in morphology as well as researchers working in mathematical image processing. (Received October 05, 2004)