1009-49-15 **William K. Allard*** (wka@math.duke.edu), Mathematics Department, Duke University, Box 90320, Durham, NC 27708. *On the regularity and curvature properties of level sets of minimizers for denoising models using total variation regularization.*

Let $s \in \mathbf{L}_\infty(\Omega)$, let $\gamma : \mathbf{R} \to [0, \infty)$ be zero at zero, nondecreasing and smooth on $[0, \infty)$ and convex. Let $\epsilon > 0$ and, for $f \in \mathbf{L}_\infty(\Omega)$, let

$$F_\epsilon(f) = \epsilon \mathbf{TV}(f) + \int_\Omega \gamma(f(x) - s(x))\, d\mathbf{L}^n x.;$$

here $\mathbf{TV}(f)$ is the total variation of f. A minimizer of F_ϵ is called a **total variation regularization (TVR) of** s. In the denoising literature the second term would be called a **fidelity** term in that it measures deviation from s which could be a noisy grayscale image.

Let f be a TVR of F. The first main result of this paper is that the reduced boundaries of the sets $\{f \geq y\}$, $y \in \mathbf{R}$, are $C^{1+\mu}$ hypersurfaces for any $\mu \in (0, 1)$ with generalized mean curvature bounded in terms of y and the essential supremum of $|s|$. A second result gives precise curvature information about the reduced boundary of $\{f \geq y\}$ near points where s is smooth. This curvature information will allow us to construct a number of interesting examples of TVRs. In addition to providing insight as to the nature of TVRs, these examples may be used to validate computational schemes which purport to approximate TVRs. (Received June 08, 2005)