WPI HAROLD J GAY LECTURE SERIES

PDEs and Fractals

Geometry with its applications has been at the heart of the development of partial differential equations and boundary value problems since the very beginning. In physics, biology, economics, and other applied fields, a variety of new problems are now emerging that display unusual geometrical, analytical and scaling features, possibly of fractal type. The objective of these lectures is to acquire the view of outstanding mathematicians on the subject of differential equations and fractals, and their developments and applications, in a broad perspective encompassing both classical highlights and contemporary trends.

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PDEs and Variational-based Models for Image Restoring

Friday, April 25, 2014
3:10pm, Kaven Hall 116

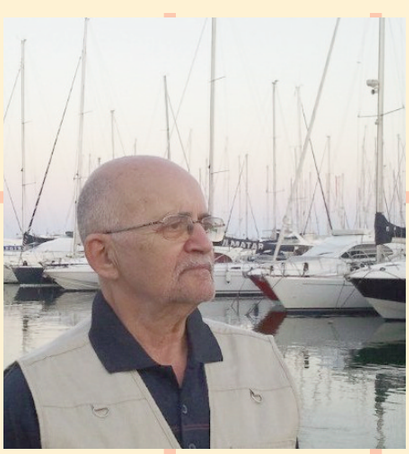
ABSTRACT Given the domain $\Omega \subset R2$, denote by $u = u(x1; x2)$, $(x1; x2) \in \Omega$, the true image and by $f = f(x1; x2)$ the observed (blurred image). The image restoration problem is to recover u from f. The PDE model for image restoration (denoising) reduces this problem to the variational problem

$$\min_{u} \int_{\Omega} \left(\left| u(x) - f(x) \right|^2 + g\left(x, \nabla u(x)\right)\right) dx,$$

where g is a certain function. Formally, this problem is equivalent to the elliptic problem

$$-\mathrm{div}\, g\left(x, \nabla u\right) + 2\left(u - f\right) = 0 \text{ in } \Omega, \qquad \frac{\partial u}{\partial v} = 0 \quad \text{on } \partial\Omega$$

The successful restoring methods which exist are based on a convenient choice of the function g, such that the restored image to be smooth and also to recognize the edges. In this talk, we survey a few denoising methods based on this approach.



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Refreshments available before the lecture in Kaven Hall 116

Participation of faculty and students is most welcome

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