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*Decomposition of diffusion operators and application in image analysis.* Preliminary report.

Diffusion equation is a class of partial differential equation widely used in image analysis community, especially for multiscale analysis. The decomposition of diffusion operator using local coordinate system is considered as a better way to understand how the diffusion operators affect 1D or 2D signals, however there are contradicting conclusions of the decomposition form in the literature. In this talk, we would like to review the previous studies on diffusion operator decomposition and give a new formation and interpretation of the decomposition with both analytic analysis and numerical experiments for both 1D and 2D signals. As one application, the nonlinear diffusion operator will be shown for the detection of local image scale with any given orientation. (Received September 26, 2012)