

Simultaneous denoising and enhancement of signals by a fractal conservation law

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We propose a new filtering method for simultaneous noise reduction and enhancement of signals using a fractal scalar conservation law which is simply the forward heat equation modified by a fractional anti-diffusive term of lower order. This kind of equation has been first introduced by physicists to describe morphodynamics of sand dunes. To evaluate the performance of this new filter, we perform a number of numerical tests on signals: electrocardiogram (ECG), Gaussian signal,... Numerical simulations are based on finite difference schemes or Fast and Fourier Transform. We used two well-known measuring metrics in signal processing for the comparison. The results indicate that the proposed method outperforms the well-known Savitzky-Golay filter in signal denoising.

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