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Random noise attenuation using an improved anisotropic total variation regularization

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Abstract

In seismic data processing, attenuation of random noise from the observed data is the basic step which improves the signal-to-noise ratio (SNR) of seismic data. In this paper, we proposed an anisotropic total bounded variation regularization approach to attenuate noise. An improved constraint convex optimization model is formulated for this approach and then the split Bregman algorithm is used to solve the optimization model. Generalized cross validation (GCV) technique is used to estimate the regularization parameter. Synthetic and real seismic data are considered to show the out performance of the proposed method in terms of event-preserving denoising, in comparison with FX deconvolution, shearlet hard thresholding, and anisotropic total variation methods. The numerical results indicate that the proposed method effectively attenuates random noise by preserving the structure and important features of seismic data.

Keywords: Bounded variation regularization, sparse representation, seismic random noise attenuation

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