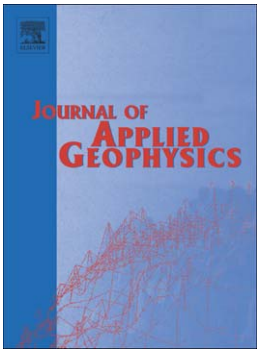

Random noise attenuation using an improved anisotropic total variation regularization

Diriba Gemechu, Huan Yuan, Jianwei Ma

PII: S0926-9851(17)30199-4
DOI: doi:10.1016/j.jappgeo.2017.07.003
Reference: APPGEO 3302

To appear in: *Journal of Applied Geophysics*

Received date: 27 February 2017
Revised date: 16 May 2017
Accepted date: 9 July 2017

Please cite this article as: Gemechu, Diriba, Yuan, Huan, Ma, Jianwei, Random noise attenuation using an improved anisotropic total variation regularization, *Journal of Applied Geophysics* (2017), doi:10.1016/j.jappgeo.2017.07.003

Random noise attenuation using an improved anisotropic total variation regularization

Diriba Gemechu[a], Huan Yuan[b], Jianwei Ma[a,*]

[a]*Department of Mathematics, Harbin Institute of Technology, Harbin, 150001, China*
[b]*Research Institute of Petroleum Exploration and Development-Northwest, Petrochina, Lanzhou, China*

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

*Corresponding author
Email address: jma@hit.edu.cn (Jianwei Ma)