Iterative Regularization and Optimization Algorithms for Seismic Migration and Inversion Imaging

Y. F. Wang[1], **Z. H. Li**[2], **and C. C. Yang**[3]

Abstract: In this paper, we consider new solution methods for seismic migration and inversion imaging problems. Direct migration methods, using the adjoint operator L^T, usually yield a lower resolution or blurred image. Linearized migration inversion requires solving a least-squares migration (LSM) problem. However, we notice that the LSM method is quite time-consuming in computation which is a severe obstacle for practical applications. We study iterative gradient methods and propose an efficient solution method for migration deconvolution imaging. We first formulate the problem by incorporating nonsmooth regularizing constraint, and then propose to apply a preconditioning technique and a nonmonotone gradient descent method to accelerate the convergence. To show the potential for application of the proposed method, we perform one-dimensional, two-dimensional and three-dimensional point scatterer seismic inversion. Numerical performance indicates that the proposed method is very promising for practical seismic migration deconvolution imaging.

1,2,3 Institute of Geology and Geophysics
Chinese Academy of Sciences
P.O.Box 9825, Beijing, 100029, China
yfwang@mail.iggcas.ac.cn