Thursday, March 17, 2005

HESS Building • 5430 Westheimer, Houston
Social 5:30 p.m.

Cost: $25
Call or email Dale Bird, by noon Tuesday, March 15, 2005
281-463-3816 or dale@birdgeo.com

GSH Potential Fields Group
Dinner Meeting

by ***Yaoguo Li***
Colorado School of Mines

3D Inversion of Potential-field Data and its Applications in Exploration Problems

Gravity and magnetic methods have been applied successfully to a wide variety of problems such as archaeological mapping, environmental clean up and mineral and petroleum exploration. Unfortunately, these methods have frequently been stigmatized as being non-unique and viewed with suspicion. The notion of non-uniqueness, however, stems mainly from the mathematical properties of potential fields and has little to do with realistic geologic scenarios. In reality, geologic units producing the gravity or magnetic data that we acquire in real-world problems do not have an arbitrary variability. Imposing simple restrictions on admissible solutions often leads to a definitive interpretation of potential field data. Practicing geophysicists have been implicitly doing it for decades, and now generalized inversion algorithms following a similar philosophy can do it too and perhaps do it better. In this presentation, I will first outline one basic approach to the 3D inversion of potential-field data using Tikhonov regularization. This approach focuses on constructing physical property models or interfaces by minimizing a model objective function subject to fitting the observed data. Prior conception of geology and other independent information can be easily incorporated into the inversion so that geologically plausible models are produced. I will discuss aspects of numerical computation for large-scale problems and illustrate the effectiveness of the method by examples drawn from mineral and petroleum exploration. ■

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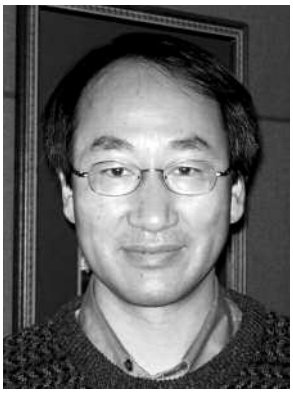
Biographical Sketch



Yaoguo Li received his BSc in geophysics from the Wuhan College of Geology in 1983 and a PhD in geophysics from the University of British Columbia in 1992. He worked with the UBC Geophysical Inversion Facility at UBC from 1992 to 1999, first as a Post-doctoral Fellow and then as a Research Associate. He is currently an Associate Professor of Geophysics at the Colorado School of Mines and leads the Center for Gravity, Electrical, and Magnetic Studies (CGEM). He is a member of the Editorial Board of the *Journal of Applied Geophysics*. He is a co-recipient of the 1999 Gerald W. Hohmann Award. His research interests include inverse theory; inversion of gravity and magnetic, and electromagnetic data arising from applied geophysics; and their application to resource exploration and environmental problems. He is the principal developer of many software packages including DCIP3D, GRAV3D, GG3D, and MAG3D for inverting electrical, gravity, gradient, and magnetic data in 3D.