ground EM surveys and drillings. They show similar results.

Inversion of Vertical Magnetic Dipole Data over a Layered Structure

W. E. Glenn, Jisoo Ryu, W. J. Peeples, and S. H. Ward

An application of the generalized inverse theory to the inversion of measured vertical and horizontal magnetic field components scattered by a layered earth in the presence of a vertical magnetic dipole illustrates the several advantages the inverse technique has over the conventional curve-matching techniques normally employed in geophysical-exploration interpretations. In particular, it provides four important results: (1) a method of direct interpretation on the data which, in the overconstrained case, results in several least-squares solutions; (2) a means to establish a statistical evaluation of the parameter resolution; (3) a basis for posing the interpretation model in a stochastic framework wherein a covariance matrix of input errors may be used to estimate the effect of input noise on parameter resolution; and (4) a method of optimizing experimental design wherein the optimum choice of source frequencies and source-receiver separations can be made from an examination of both the information density matrix and the resolution matrix.

Electromagnetic Finite Difference Modeling

Roy J. Greenfield

The types of partial differential equations which govern scaler-wave propagation, electric-current flow, and electromagnetic induction phenomena will be discussed. These equations together with their associated boundary conditions can be expressed in terms of finite difference formulas. Some of the methods of solution will be sketched, and the concept of stability will be stated and illustrated by examples.

Radiation from an Explosion in a Nonuniformly Prestressed Medium

Anil Grover

It is known that both an increase of the cavity size and rupture propagation from an explosion in a prestressed medium will release strain energy stored in the initially strained material, thus affecting the seismic radiation field. Under uniaxial tension, a distribution of shear stresses was produced in the rhomboid-shaped Plexiglas plate. The static stress analysis was done by the photoelastic and analytic methods. A cylindrical explosive charge was used as a source to generate seismic waves. The termination of the crack propagation produced a detectable secondary seismic arrival, corresponding to the stopping phase. The direction of cracks corresponded to the theoretically computed average orientation of the maximum shear stresses and close to the normal to the applied tens... The velocity of the crack propagation was determin... as 0.833 km/sec, 0.61 times the shear-wave velocity ... the Plexiglas. The radiation pattern of a P-wave ... altered from its cylindrical symmetry. It is conclud... from our experiments that no S-waves are gener... from a cylindrical symmetric line source in the ... sence of prestresses and significant inhomogenity. ... increase of S-wave amplitudes might be suggested ... the criterion for determining the effect of stored str... energy release and of radial cracking. Distribution ... ambient stresses in the medium produced an observ... ble effect on the frequency spectrum of an explosion.

Microearthquake Studies for Exploration and Development of Geothermal Resources

R. M. Hamilton and P. L. Ward

Detailed studies show that microearthquakes occ... in geothermal areas in Iceland and El Salvador and ... The Geysers, in California. Most of these earthquak... range in depth from near surface to about 6 km, and ... hypocenters are either clustered or occur along line... trends subparallel to faults mapped within or near th... geothermal areas. Parts of the geothermal areas ex... hibit no seismic activity. The earthquakes apparently ... are associated with faults traversing the area. These ... faults may provide the channel for hot water to reach ... shallow depth. The earthquakes may be explained by ... the Hubbert-Rubey theory, which states that the fric... tional strength of a fault is reduced by increased fluid ... pore pressure. A more likely explanation may be that ... the rocks in geothermal areas are weaker than rocks ... nearby because of hydrothermal alteration, water ... weakening, or stress corrosion. In any case, if the dis... tribution of microearthquakes is accurately mapped, ... seismically active faults can be delineated, and this ... should aid in the exploration for geothermal resources.

Topographic and Terrain Correction for Airborne Gravity

Sigmund Hammer

A simple, convenient procedure is outlined for eval... uating topographic and terrain effects in airborne gra... vimetry. The method is based on assumed availability ... of continuous terrain data along a traverse. The ter... rain is taken to be uniform to infinity in both direc... tions perpendicular to the flight line. In-flight correc... tion for topographic and terrain effects is not a ma... jor obstacle in the development of airborne gravity ... exploration.

The Emerging Role of Geophysics in the Management Program of the Federal Mineral Estate

Lowell G. Hammons and Charles H. Morris

The Conservation Division of the United Stat... Geological Survey is responsible for the classificatio...

...valuation of the Federal Mi... ...vision of mineral productio... ...physics in the overall mana... ...significantly since 1968 ... ...was granted to initiate p... ...y geophysical data to pro... ...ing support for a more effe... ...and lease-management pro... ...ental Shelf. Since that da... ...on has been active in dev... ...ysical data repository of ... ...on depth point, digitally ... ...on data in selected OCS a... ...but highly qualified geo... ...of experienced personnel is ... ...ort in each of the four OCS ... ...the present time approxima... ...ep focus common-depth-poi... ...on data have been purchase... ...n by division geophysical ... ...8000 line-miles of shallow ... ...hysical data are under inter... ...ins to lease management and ... ...More data, deep and shall... ...acquisition as new areas o... ...med for evaluation. Refiner... ...pretation currently availab... ...ed through application of ... ...s under development to enh... ...shore geophysics, time, pe... ...itting, will also play a mo... ...e development and manag... ...Consideration for the use ... ...ment and analysis of new ... ...pport the division mission ... ...ical evaluation.

...hysical Methods in Geother...

...RMAN Harthill.

...othermal exploration is ... ...in the United States but ... ...arable to that of early p... ...e little is known of the nat... ...rs, the published data indic... ...f superheated water locate... ...ns between 1 and 3 km. Th... ...define the location of this ... ...and temperature. The mos... ...arameter of superheated w... ...conductivity. Many tech... ...conductivity have been us... ...ad most success is the di... ...h is capable of delineatin... ...es down to depths of gre... ...effect from surface conditi... ...ied by time-domain elect...