AOB Seminar

Basic tomography problem and new alternative for its solution

Dr. T. A. Smaglichenko
Institute of Gas and Oil Problems, Russian Academy of Science, Russia

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Conference Room I (annex of AOB)

In the evening of 30th, we are going to have a welcome party.

ABSTRACT

The seismic data observed for tomography studies posses a resolving power limited to rather large-size structures. A large anomaly surrounded by a uniform zone or neighboring large inhomogeneities can give a reason for the ambiguous results. The standard methods including the Lanczos process (or LSQR algorithm) may overcome this difficulty by using different grid or modifying the sources and receivers distribution. Another important problem is a possible restriction for the seismic experiment caused for instance by marine conditions. Then the ordinary methods poorly reconstruct both large and small-size structures. On the base of optimal selection of iterative parameters, the algebraic technique is proposed to improve the resolution of complicated structure, in particular, for the case of insufficient independent observations. In local earthquake tomography this method was developed as the travel time tomography inversion and named by the method for the Consecutive Subtraction of Selected Anomalies (CSSA). The CSSA calculating scheme is described in such a way that it could be useful for application to any linear inverse problem arising in seismology or in other branches of geophysics. The main differences between the CSSA algorithm and the Lanczos method are outlined. On each iteration step, the parameter that is most responsible for the smallest lsq functional is investigated. Then the corresponding solution is selected, if this parameter is consistent with the resolution criteria advanced. A distinctive feature of the proposed technique is relative freedom in the selection of the starting vector for inversion. Iterative parameters are able to account the quality of the starting approximation and the resolution can be improved using the appropriated vector. It is concluded that the described CSSA alternative can be extended to solve general inverse problem with different data sets.

主催：東北大学大学院理学研究科

地震・噴火予知研究観測センター

Tel: 022-225-1950 (代表)

Tohoku Univercity
AOB

Research Center for Prediction of Earthquakes and Volcanic Eruptions