



Willi Freeden

Decorrelative Mollifier Gravimetry

Basics, Ideas, Concepts, and Examples

Series: Geosystems Mathematics

- Provides new insight into the current state of multi-scale gravimetric research and its applications in geoexploration
- Demonstrates how reducing gravimetry to mathematically accessible decorrelated models can make unresolved questions and problems of gravimetry accessible to a broad scientific audience
- Highlights the interconnection of several different geo-disciplines
- Incorporates data and numerical results from methodological tests in the German Saarland area

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This monograph presents the geoscientific context arising in decorrelative gravitational exploration to determine the mass density distribution inside the Earth. First, an insight into the current state of research is given by reducing gravimetry to mathematically accessible, and thus calculable, decorrelated models. In this way, the various unresolved questions and problems of gravimetry are made available to a broad scientific audience and the exploration industry. New theoretical developments will be given, and innovative ways of modeling geologic layers and faults by mollifier regularization techniques are shown. This book is dedicated to surface as well as volume geology with potential data primarily of terrestrial origin. For deep geology, the geomathematical decorrelation methods are to be designed in such a way that depth information (e.g., in boreholes) may be canonically entered. Bridging several different geo-disciplines, this book leads in a cycle from the potential measurements made by geoengineers, to the cleansing of data by geophysicists and geoengineers, to the subsequent theory and model formation, computer-based implementation, and numerical calculation and simulations made by geomathematicians, to interpretation by geologists, and, if necessary, back. It therefore spans the spectrum from geoengineering, especially geodesy, via geophysics to geomathematics and geology, and back. Using the German Saarland area for methodological tests, important new fields of application are opened, particularly for regions with mining-related cavities or dense development in today's geo-exploration.

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