Session 7: Deterministic and Random Fields Analysis with Applications to BVP, Approximation Theory

Part I

Sanso F., Sacerdote F.
On the Universal Solvability of Classical Boundary-Value Problems of Potential Theory: a Contribution from Geodesy (Invited)

Holota P., Nesvadba O.,
Model Refinements and Numerical Solutions of Weakly Formulated Boundary-value Problems in Physical Geodesy

Yu J.H., Peng F.Q.
A New Solving Principle on Over-Determined Boundary-Value Problems and its Applications in the Earth’s Gravity Field

Li F., Zhang L.M.
GPS/Gravity Boundary-Value Problem and its Practical Solution

Wang Y.M.
On the Solution of the Geodetic Interior Boundary-Value Problem for Known Density of the Topography
Part II

Freeden W.
Local Multiscale Modelling of Geoid Undulations from Deflections of the Vertical (Invited)

Čunderlík R., Mikula K., Mojzeš M.
BEM for the Neumann Geodetic Boundary-Value Problem

Ardalan A., Safari A., Jomegi A
How to Compute Geoid Based on Irregularly Distributed Gravity Data on the Surface of the Earth with Gaps?

Cui C.F., Lelgemann D., Chen C.M
Integrable Approximate Systems of a Canonical System - An Unique Method to Solve Canonical Perturbation Problems Approximately

Luo Z.C., Cao H.S., Li J.C., Wang Y.T.
Determination of the Earth’s Gravity Field by Combining the Satellite Gravity Field and the Gravity Anomalies on the Earth’s Surface
Poster Part

Austen G., Keller W.
On an Ellipsoidal Approach to the Singularity-Free Gravity-space Theory

Wang Y.M., Roman D., J. Saleh J.
Analytical Downward and Upward Continuation Based On Local Functions and Variational Principles

Holota P.
An Optimized Solution of Two-Boundary Problems in Combining Terrestrial and satellite Gravity Field Data
Original Description of the Session:

In geodesy fields governed by equations of mathematical physics are now accessible through a huge number of measurements of the unprecedented accuracy. The measurements are varied in nature and much densely distributed in space and time than ever before. The gravity field of the Earth and satellite gravity missions give an important example. The situation stimulates further developments of mathematical methods for studies of the fields considered, their recovery from existing data and interpretation.

Boundary-value problems represent an important concept in this context. Its use in geodesy is particularly developed within a deterministic approach. The concept is very powerful and offers important tools for treating classical as well as newly formulated problems of geodetic relevance. Presentations of advancements regarding the solution and analysis of these problems are highly welcome. However, boundary data are noisy in reality and the problem is to explain what is the meaning of the solution of a boundary-value problem with data of this kind. This can be correctly done in the framework of generalized random field theory. Therefore, papers concerning these aspects and stochastic differential equations are also very much solicited in this session.

The general concepts above give more space for treating overdetermined boundary-value problems that naturally appear in connection with the great amount of existing data. The same holds true for the development of suitable tools for solving improperly posed problems, that now seem to cover important aspects in geodesy oriented studies on Earth gravity field. Again, contributions to these problems are welcome.

Finally, we also very much invite papers dealing with approximation methods, iteration concepts and a numerical stability in solving the problems under consideration. The same is true for contributions concerning the art of computation when treating the computer realization of the respective solutions.
Within the *ICCT of the IAG* all these topics and results are in particular strongly related to:

**WG ICCT3** – Functional Analysis, Field Theory and Differential Equations (*Chaired by Jinhai Yu*)
Many thanks
to all the speakers and authors who contributed to the success of Session 7 by preparing an oral or poster presentation
and also
to all the local and international organizers for including the topics of Session 7 into the scientific program of the IV Hotine-Marussi Symposium on Theoretical and Computational Geodesy in Wuhan, 2006!