1133-44-231 **Willi Freeden*** (freeden@rhrk.uni-kl.de), Department of Mathematics, MPI Building 26, 67663 Kaiserslautern, Rhineland-, Germany, and **M. Zuhair Nashed** (znshed@mail.ucf.edu), Department of Mathematics, Orlando, FL 32816. *Inverse Gravimetry: Geomathematical Background and Geothermal Exploration.*

This lecture deals with the characteristic ill-posed and inverse features of transferring input gravitational information in the form of Newtonian volume integral values to geological output characteristics of the density contrast function. Some properties of the Newton volume integral are recapitulated. Different methodologies of the resolution of the inverse gravimetry problem and their numerical implementations are examined dependent on the data source. Three cases of input information may be distinguished, namely internal (borehole), terrestrial (surface), and/or external (spaceborne) gravitational data sets. Singular integral theory based inversion of the Newtonian integral equation such as Haar-type solutions are proposed in a multi-scale framework to decorrelate specific geological signal signatures with respect to inherently available features. Reproducing kernel Hilbert space regularization techniques are studied (together with their transition to mollified variants) to provide geological contrast density distributions by downward continuation from terrestrial and/or spaceborne data. Finally, reproducing kernel Hilbert space solutions are formulated for use of gravimeter data, independent of a specifically chosen input area, i.e., in whole Euclidean space. (Received July 27, 2017)