Encom™ ModelVision™ v10.0

ADVANCED 3D MODELLING SOLUTION FOR MAGNETIC AND GRAVITY DATA.

Summary

Encom™ ModelVision software provides a solution for every 3D potential field problem. Whether you work in mineral exploration, diamond exploration, petroleum exploration, environmental geophysics, engineering, unexploded ordnance or underground hazard assessment, the ModelVision application can provide you with a complete modelling and interpretation environment for magnetic and gravity datasets.

Benefits

- Provides a wide range of import/export formats, utilities for gridding, filtering and numerical manipulation.

- Inversion methods include Quick Invert, Standard Inversion and Joint Inversion.

- Provides interactive interface to control inversion based upon your understanding of the probable geological style.

- Choose from two optional modules: AutoMag™ and UBC Model Mesh Designer.

OVERVIEW

Pitney Bowes Business Insight's latest release of the Encom™ ModelVision continues the tradition in software releases of presenting innovative modelling techniques for magnetics and gravity data. Not only does this exciting release of the industry standard in potential field modelling software provide special functionality to assist with processing and modelling data but it also represents improvements in the everyday functionality used by geoscientists worldwide.

2D and 3D Modelling

The ModelVision application performs all modelling in 3D but provides the operational efficiency of 2D modelling by providing optimised cross-sections.

Use the software to build complex 3D geological models from hand drawn polygons or imported ESRI and MapInfo® GIS vector files using the 3D Model Generator and Extrusion Wizard plug-in. Use this tool to convert 2D map polygonal interpretations into a meaningful 3D model with associated properties of elevation, volume, density and susceptibility.

More than Modelling

The ModelVision application provides you with a wide range of import and export formats, utilities for gridding, filtering and numerical manipulation. There are tools for survey simulation so that you can plan and predict the field specifications for gravity and magnetic surveys,

including all tensor components. You can create an airborne survey from a digital terrain grid or create a set of synthetic drillholes in a simulated geological model.

The ModelVision application supports a variety of mapping methods and allows you to superimpose the plan view of your model in the map view along with other data layers, such as grid images, contours, georeferenced images, drillholes, stacked profiles, and many more. The display properties of these data layers for both map and cross-section views is managed by Layer Tables providing immediate access to each data object type for the control of visibility and design.
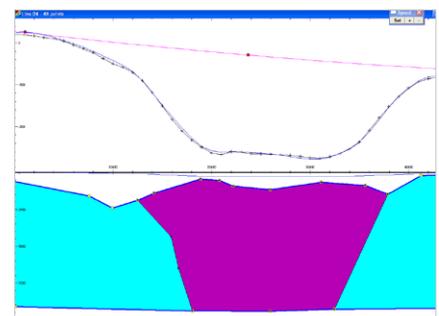

Cross-section display example showing the modelling of gravity data using multiple polygonal bodies joined together to form a polygroup.

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CHOOSE FROM A LARGE RANGE OF PARAMETRIC SHAPES AND MANUALLY DRAWN BODIES TO CREATE A GEOLOGICAL MODEL SPECIFIC TO THE PROJECT AT HAND.

Data Processing and Utilities

ModelVision contains a large number of useful utilities for gridding, grid interpolation, grid filtering, line filtering, terrain correction, and a calculator that operates on lines, points, drillholes and grids.
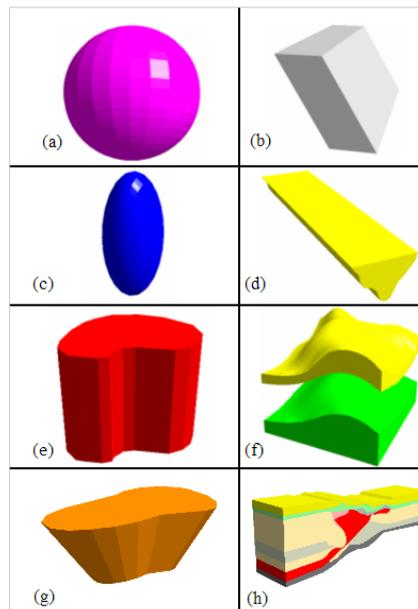
Choose from a large range of body types to create the perfect model. Body types include: a) sphere, b) tabular, c) ellipse, d) polygon, e) plunging prism or frustrum, f) general polyhedron, g) pipe, h) polygroup.

Other utilities include generating movies, a survey simulator, and a drillhole simulator with output drillholes that can be tagged to a topographic surface and viewed in 3D. New in ModelVision v10.0, the Move Mode utility allows the user to capture changes to a model made during inversion and then replay the changes as a movie.

3D Geology Inversion

ModelVision provides you with an interactive interface to control and guide the inversion based upon your understanding of the probable geological style.

The very fast Quick Invert is designed for magnetic interpretation of line magnetic data where the geology is associated with steeply dipping magnetic rock units or dykes.

The standard Inversion supports full 3D inversion of magnetic and gravity data for all ModelVision body styles. It inverts on a single data channel such as TMI, 1VD, Gz, Gzz etc. Geological parameters can be clamped or constrained within appropriate geological limits.
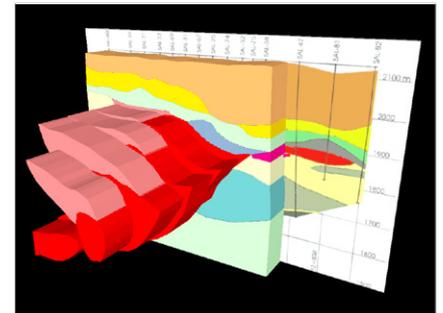
A series of polygroup bodies modelled on survey lines using a geo-located scanned image of a geological cross-section for reference.

Finally, the Joint Inversion method supports co-sampled, multi-channel 3D data from multi-sensor instruments such as full tensor gravity gradiometers, full tensor magnetometers, flux gate magnetometer arrays, total magnetic field horizontal gradiometers and vertical magnetic field gradiometers.

Gravity and magnetic data are inverted separately for the same geological model.

Gravity & Magnetic Gradiometer Simulation

ModelVision models the full gravity tensor so you can model data collected by the Bell Geospace or BHP Billiton Falcon™ airborne gravity gradiometer systems.

Cross-wing, total field magnetic gradiometers are used widely for enhanced gridding, but the Joint Inversion technology in ModelVision allows you to invert for off-line targets by fully utilising the lateral gradient information.

You can simulate total field magnetic gradiometer surveys for the next generation of SQUID magnetometers that measure the full magnetic field tensor.
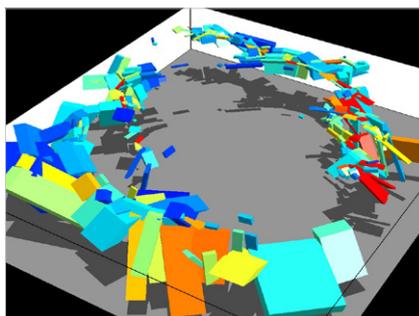
No survey is too complex to model with Encom ModelVision.

You can analyse the model components, the vertical gradient or full tensor. The 3D visualisation assists with understanding the relationship between the model and the tensor direction.

Terrain Correction in ModelVision

The Terrain Response Calculator utility available in ModelVision v10.0 significantly reduces the amount of calculation time needed to perform the necessary correction for the effect of the terrain when modelling gravity data. In previous versions of ModelVision the terrain correction was performed by calculating the forward model of the terrain using constant density of a General Polyhedron body type with constant mesh size, and the resultant effect of this was then removed from the response.

The Terrain Response calculator now provides a new method of calculation by varying the mesh size from being coarse at larger distances from the calculation point to small mesh sizes at short distances from the calculation point. This therefore improves efficiency of the calculation, particularly for large surveys by improving calculation time when a coarse mesh can be used at distances with negligible impact.

Encom™ AutoMag™ Module

The Encom AutoMag optional module for the ModelVision application enables rapid magnetic depth-to-basement source estimation and fast processing of large surveys. The module is based on a refined version of the Naudy dipping tabular body inversion method which provides quality geological information for depth, magnetic susceptibility, thickness and dip. An innovative strike azimuth Trend Grid has added the ability to automate corrections for geological units that cross the flight lines at an acute angle. This method out performs other automated methods because it uses a realistic geological model for steeply dipping, semi-linear magnetic rocks such as volcanics, ironstone formations and dykes.
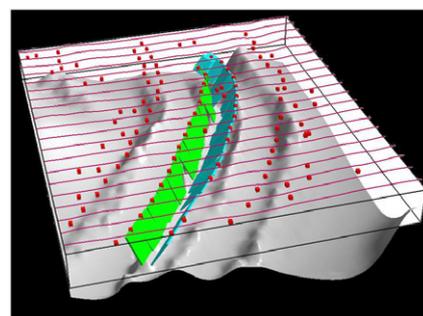
Perspective view of tabular bodies computed from the AutoMag module with corresponding AutoMag point solutions, integrated with a TMI magnetic grid surface.

Anomaly Detector

The Anomaly Detector correlates a trial model magnetic anomaly window with every selected line in the survey to locate significant magnetic anomalies for detailed inversion. The tuning of the trial model has been optimised by providing a tool to select a "typical" magnetic anomaly of interest which is then directly modelled and inverted to provide the detection parameters.

Anomaly Trend Analysis

Anomaly Trend Analysis operates on the reduced to pole magnetic grid of the survey area and produce a magnetic anomaly trend direction grid that covers the same area as the original grid. The trend grid then provides the information needed for strike correction of the model parameters obtained by Naudy inversion of each detected magnetic anomaly.

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Batch Processing

Allows you to select a subset or all lines in the survey for application of the parameters chosen during the Anomaly Detection phase. This process is very fast and allows you to process large surveys in just a few minutes.

Solution Filtering

The processing stage produces many solutions which require elimination based on reasonable geological criteria. The dynamic solution filtering provides a tool that removes solutions from the display in real time while thresholds are set on parameters such as dip, correlation thresholds, upward continuation level and relative anomaly trend direction and trend confidence. The immediate feedback of the live filtering allows you to quickly determine depth of burial over large areas. Further refinement can be performed with fine tuning of the filters and direct modelling in ModelVision.
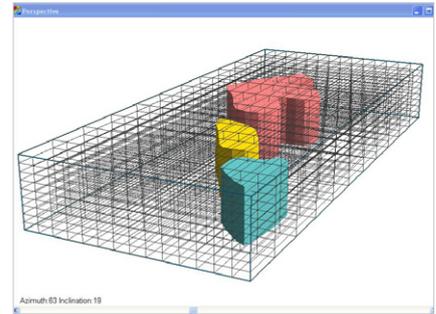
UBC Model Mesh Designer

UBC Model

An optional Mesh Designer module for the ModelVision application makes it easy to prepare and run UBC-GIF GRAV3D and MAG3D smooth inversions. The solid models are converted to mesh models by assigning properties to each mesh cell that falls inside a body. The density and susceptibility of that body are assigned to each cell.

Easy Mesh Design

A dynamic mesh designer provides full control over the mesh density for the core and padded zone of the 3D model. The relationship between the mesh and the geological model is visualised in 3D and modified to ensure optimum coverage of the core zone. The mesh density can be easily modified to allow rapid prototype testing in MAG3D and GRAV3D, this ensures all parameters are optimised prior to running a high resolution inversion that may run for hours or days.

Use the UBC Model Mesh designer to convert models to UBC format ready to load directly into the UBC-GIF programs.

Automated Population of the 3D Mesh

ModelVision models hold both the magnetic susceptibility and density properties of the geological bodies making it easy to create either a UBC MAG3D or GRAV3D model. Properties are assigned to the mesh on the basis that each voxel is dominant within a particular body within the model, and the background property is assigned to all unpopulated voxels. Any changes that are made to the input model are then easily updated in the UBC-GIF voxel model.

Run MAG3D and GRAV3D from ModelVision

Once the mesh design has been completed, the mesh, properties, data and terrain are automatically exported to create each of the files required to run the UBC-GIF codes. ModelVision will start the GRAV3D or MAG3D interface programs, with all fields populated with the relevant file names.

Import Geological Models

ModelVision has the ability to import 3rd party geological models in GoCAD, 3D DXF and mine planning formats making it a relatively simple job to assign properties and build constrained UBC-GIF inversion models.

TO LEARN MORE ABOUT ENCOM MODELVISION, AUTOMAG OR UBC MODEL MESH DESIGNER, VISIT WWW.PBINSIGHT.COM.AU OR CALL +61.2.9437.6255.

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