

GAMAG

Spacecraft Magnetostatic Cleanliness Modelling Software



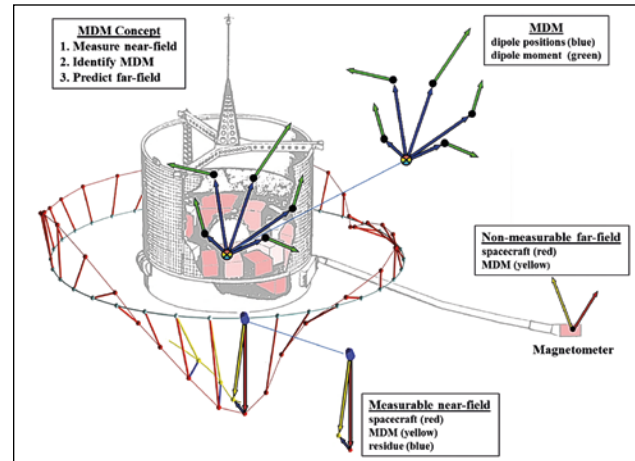
Purpose

GAMAG is a highly sophisticated tool for multipolar identification of magnetic close-range field measurements, its extrapolation to remote locations, and optimization of those far-fields w.r.t. cleanliness requirements by use of compensation techniques. GAMAG provides more specifically:

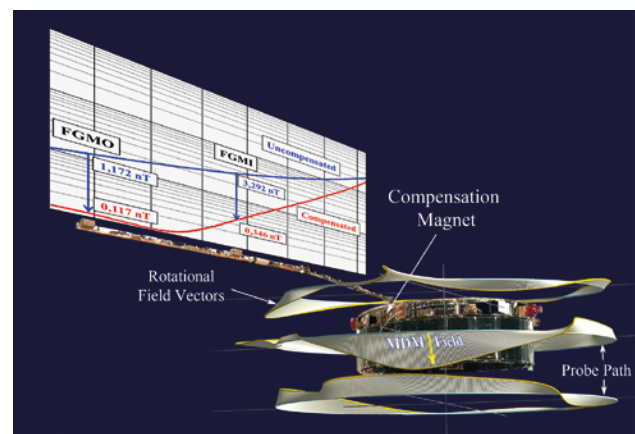
- Derivation of multiple dipole models (MDM) representing accurately close-range field vector or field gradient tensor measurements.
- Determination of field vectors and field gradient tensors at remote points of interest.
- Multiple magnet models for the compensation of field vectors and/or field gradient tensors at those remote points.
- Determination of the global dipole moment of a spacecraft or of spacecraft equipment.
- Determination of non-measurable far field of spacecraft.
- Compensation of global spacecraft moment of spacecraft to reduce magnetic field at a magnetometer and to fulfil magnetic cleanliness requirements, e.g. of science and exploration missions.
- Compensation of global spacecraft dipole moment to reduce AOCS reaction torque due to geomagnetic field.
- Examples: Giotto, Ulysses, Cluster, Cassini

MDM Modelling Performance

- Operation: fully automatic
- Precision: Error < 1%
- Speed: most complex Case < 1 min



Concept of multiple dipole model (MDM) method with magnetometer at non-measurable far field point.



Cassini before and after field compensation at the outboard magnetometer

Helmholtz Coil Facility

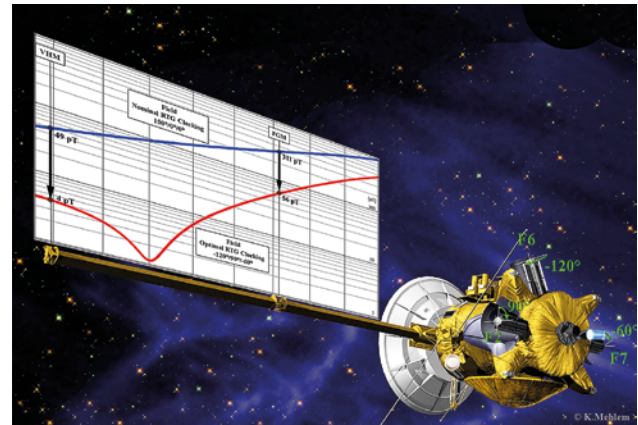
GAMAG can be delivered together with a (mobile) coil facility for measurement of the magnetic field of spacecraft units.

Software Modules

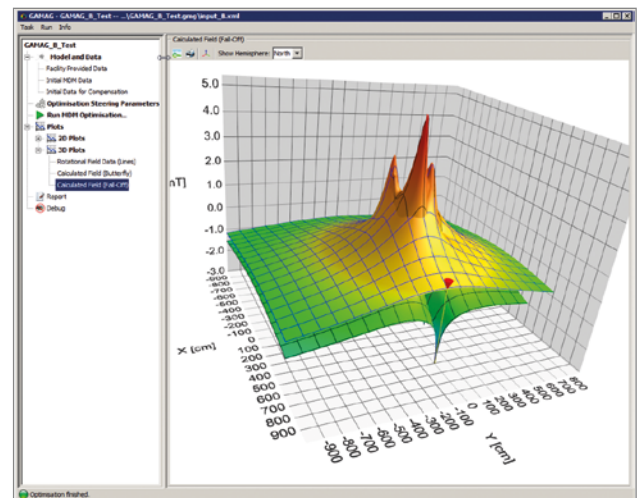
- **GAMAG-B**
Field mode computing field vectors at multiple specification points, multiple magnetic dipole model (MDM), global dipole moment and optimal multi-point compensation magnets
- **GAMAG-Bg**
Field gradient mode computing same as GAMAG-B with additional gradient information
- **GAMAG-TSUCONF**
Optimal test setup configuration
- **GAMAG-BSIM**
Field simulator providing MDM field at multiple points
- **GAMAG-BgSIM**
Field gradient simulator providing MDM field gradient at multiple points
- **GAMAG-SSCM**
Synthetic spacecraft model providing synthetic spacecraft MDM, field vectors, reverse engineered spacecraft MDM and global spacecraft dipole moment
- **GAMAG-DIMAL**
Dipole moment allocation list compliant with specification at 3sigma
- **GAMAG-SAE**
Ambiguity error analysis computing maximum of 3-sigma field deviations generated by a population of ambiguous MDMs on a sphere.
- **GAMAG-TSUCAL**
Calibration of test set-up with identification of probe positions

Features

- Graphical user interface with extensive analysis capabilities, interactive graphics and detailed analysis report



3D interactive fall-off plot



3D interactive data fit plot

- Data acquisition modes: rotational, translational, static
- Automatic determination of minimum number of necessary dipoles

License Policy

Perpetual node locked or floating license, software updates for one year, initial training in Stuttgart, Germany.