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 fulfill 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

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

License Policy

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