

HELMHOLTZ ORBITAL GEOMAGNETIC SIMULATOR (HOMS)

ADCS ORBITAL CHARACTERISATION, MAGNETOMETER
CALIBRATION

Product Overview

Ground-based satellite ADCS characterisation requires accurate reproduction of the Earth's magnetic field as experienced along a real orbit. The HELMHOLTZ ORBITAL GEOMAGNETIC SIMULATOR is a three-axis Helmholtz coil system designed to generate controlled magnetic fields in the X, Y, and Z directions, replicating true orbital magnetic conditions on the ground. The system can generate complete geomagnetic field profiles for any given Low Earth Orbit (LEO), enabling more than 90 minutes of continuous real-orbit magnetic field simulation across the entire orbit. It also supports precise static magnetic field generation for magnetometer calibration.

Target Applications:

- Orbital magnetic field simulation for LEO missions
- ADCS testing and validation
- Magnetometer calibration and characterization



HOMS in clean room facility at AIDIN TECHNOLOGIES

Key Performance

- Magnetic field accuracy: ± 5 mG
- Magnetic field range: +7000 mG to -7000 mG
- Current resolution: 10 mA
- Magnetic field resolution: 2 mG per 10 mA step
- Continuous stable magnetic field holding supported
- Supported payloads: CubeSats from 1U to 6U

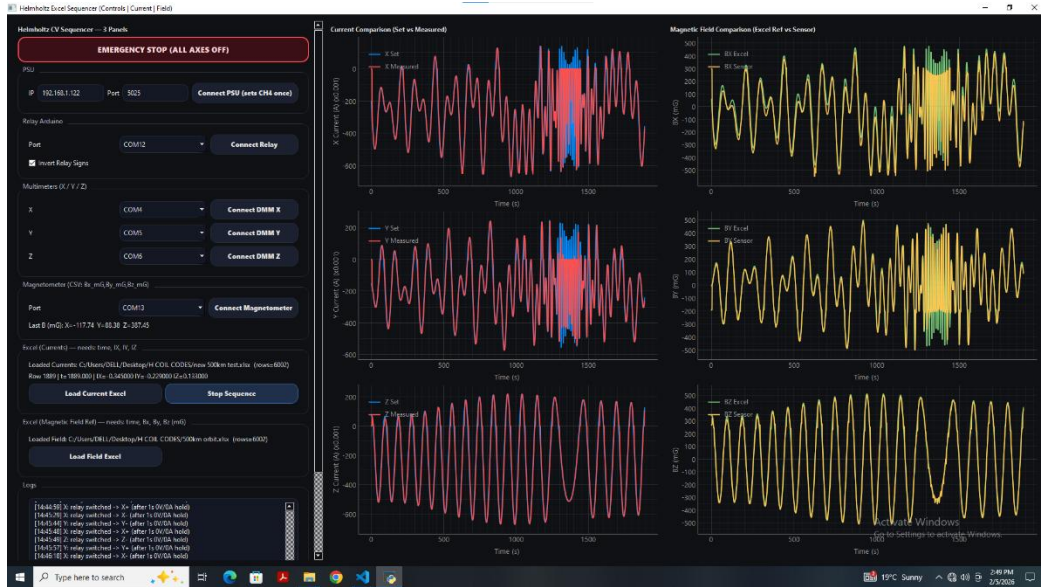
System Specifications

Parameter	Specification
Dimensions (L × W × H)	100 mm × 100 mm × 100 mm
Homogeneity sphere diameter	200 mm
Total weight	50 kg
Magnetic field axes	3-axis (X, Y, Z)
Magnetic field range	+7000 mG to -7000 mG
Control precision	10 mA current steps (2 mG per step)
Dynamic calibrator	Included (software-based)
Magnetic field control method	Linear control
Mounting options	Floor mount; modular, easy assembly/disassembly
Payload mounting	Optional air bearing
Frame material	Wood with ESD coating
Coil winding material	Copper
Control interface	USB / LAN

Performance Tests

Orbit Test:

Simulation of the complete orbital magnetic field for any specified LEO trajectory. The system reproduces time-varying geomagnetic field components across the full orbit with an accuracy of ± 5 mG, and with max 2-5% total error in orbital simulation.



Orbital simulation of 90 mins 500km LEO Orbit

Continuous Hold Test:

Provides a stable and constant magnetic field along selected axes for extended durations, enabling precise magnetometer calibration and bias estimation.



Continuous hold test



Software & Control

Software Name: H CAGE ORBITAL SIMULATOR

Supported OS: Windows

Connectivity: USB / LAN

Software Features:

- Real-time plots of set current vs measured current
- Real-time plots of set magnetic field vs measured magnetic field
- Dynamic orbital magnetic field execution
- Data export in CSV / Excel formats