



Sensors

Variable Permeability Magnetometer for Aerospace Applications

Takes advantage of the varying of the permeability of a magnetic material with ambient magnetic fields

NASA's Langley Research Center has developed a magnetometer which takes advantage of the unique variable permeability properties of Metglas 2714A magnetic material. By measuring directly the inductive reactance of a simple right circular cylindrical search coil through the application of current from a high output impedance current source driven with a 10kHz sinusoidal voltage, we have produced a magnetic field sensor having a 700 Hz bandwidth, good linearity, and excellent noise performance with sensitivity at least as good as the 0.1 nTesla range.

BENEFITS

- Simple design is easy to fabricate compared to flux gate designs.
- Inherently stable in a variety of environmental conditions, such as fluctuating temperature.
- No cryogenics required.

technology solution

NASA Technology Transfer Program

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THE TECHNOLOGY

The magnetometer consists of a circular cylindrical coil with a magnetic core. It is inherently stable with variations in environmental conditions, such as temperature. The simplicity of construction is an advantage over the flux gate design. Circuit stability is achieved through the use of a crystal oscillator for frequency stability and matched resistor networks for amplitude stability in the voltage readout. No cryogenic is required.



Drive and amplifier circuitry for magnetometer

APPLICATIONS

The technology has several potential applications:

- Aerospace
- Weather monitoring
- EMP detection
- Magnetosphere research
- Monitor Earth's magnetic field
- Solar system study
- Track solar flare activity

PUBLICATIONS

Patent Pending

Variable-u magnetometer for Aerospace Applications was presented at the Innovation Forum of Engineering Directorate on August 6, 2014.

National Aeronautics and Space Administration

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