



Broadband AC/DC hybrid magnetometer for space plasmas science

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Searchcoil magnetometers are reliable, insensitive to radiation and their good sensitivity make them essential in many space plasmas or planetary science where investigation of low magnetic [U+FB01]eld intensities is required. In spite of their numerous assets, Searchcoils are inductive based magnetometer and therefore suffer from a low sensitivity at low frequencies (down to 1 Hz). As a result AC Searchcoil magnetometers have to be associated with DC magnetometers in many scientific experiments where both high and low frequencies phenomena are involved.

A new sort of inductive/magneto-resistive hybrid magnetometer working in a frequency range from DC to a few hundreds of kiloHertz is introduced. In this hybrid configuration the measurement frequency range of classical Searchcoil magnetometer is extended down to very low frequencies thanks to the use of high sensitivity magneto-resistive sensor. The instrumental concept as well as a brief design review of a first hybrid tri-axis magnetometer prototype with a $100 \text{ pT}/\sqrt{\text{Hz}}$ resolution on the whole frequency working range are presented.

This new generation of magnetometer aims to offer a usefull redundancy to low frequencies magnetic measurements usually made by Fluxgate magnetometers in space observatories. Furthermore it can be a usefull embedded instrument in rocket experiments dedicated to polar regions science where both AC and DC magnetic measurements are often required and payload budget is limited.