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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "A Hybrid Fluxgate and Search Coil Magnetometer Concept Using a Racetrack Core" *by* David M. Miles et al.

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Comments on Miles et al., "...Hybrid Fluxgate and Search Coil..."

The paper describes an interesting concept of using a single sensor to act independently as a DC and AC magnetometer using both the traditional search coil and fluxgate techniques.

The paper doesn't currently discuss the approach in context of earlier work looking at making hybrid magnetometers that combine fluxgate and search coils. Examples of two groups (one in China and one in Japan) that have been developing such sensors are below.

Shi et al., 2017 Review of Scientific Instruments 88, 125001 (2017); doi:

10.1063/1.5013015 View online: https://doi.org/10.1063/1.5013015

F. Han, S. Harada and I. Sasada, "Fluxgate and Search Coil Hybrid: A Low-Noise Wide-Band Magnetometer," in IEEE Transactions on Magnetics, vol. 48, no. 11, pp. 3700-3703, Nov. 2012. doi: 10.1109/TMAG.2012.2196762

Are there any issues anticipated with building a 3-axis sensor in terms of cross-talk, offsets or other interference that can be described? What would be an expected possible dimensions for such a hybrid magnetometer (size, mass, power)?

What is the telemetry rate at the appropriate samples per second to extract both DC and AC signals? Would the processing be done within the FPGA or would an actual CubeSat system down load the full telemetry to be processed on the ground?

End of section 5 indicates that the racetrack core optimization is to blame for the lower sensitivity. Could the difference be due to the shape of the core instead of manufacturing or drive circuit tuning? Would you expect the same noise level solely on the material properties of the foil and its manufacturing process?

Any comment on reasons for the flat gain/response seen in Figure 11 below 100 Hz?

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