On cross-axis effect of the anisotropic magnetoresistive sensors

Kubik J., Vcelak J., Ripka P.

Czech Technical University in Prague, Faculty of Electrical Engineering, Technicka 2, 16627 Praha 6, Czech Republic

Abstract: The cross-axis effect error of typical AMR sensor can reach ±1100 nT in the Earth's field, which in the worst case may result in ±2.4° error in azimuth reading of triaxial anisotropic magnetoresistive (AMR) compass. In systems, which cannot use flipping or feedback, the cross-axis error can be numerically corrected, if we know the sensitivity and field scale constant (anisotropy field) of the particular sensor. Three new methods to measure this constant are presented: the field steps using Helmholtz coils, the sensor rotation in geomagnetic field and four-point calibration in geomagnetic field. The measurements performed for Honeywell HMC1002 sensor show that the last method gives lowest uncertainty. The correction iteration algorithm using measured constant reduces cross-axis azimuth error below ±0.04°.

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Authors with affiliations:

1. Kubik, J., Czech Technical University in Prague, Faculty of Electrical Engineering, Technicka 2, 16627 Praha 6, Czech Republic
2. Vcelak, J., Czech Technical University in Prague, Faculty of Electrical Engineering, Technicka 2, 16627 Praha 6, Czech Republic
3. Ripka, P., Czech Technical University in Prague, Faculty of Electrical Engineering, Technicka 2, 16627 Praha 6, Czech Republic