Sensors and Materials, 5, 5 (1994) 253–263
MYU, Tokyo

S & M 0142

Offset Reduction in Spinning-Current Hall Plates

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(Received July 16, 1993; accepted November 27, 1993)

Key words: Hall plate, magnetic sensor, offset reduction

Hall plates are used in a wide variety of applications, especially in the automotive industry. The drawback of Hall plates as magnetic sensors is their high offset, which causes the sensor to generate an output signal even when no magnetic field is present. Although some offset can be compensated for in the fabrication of the Hall plate, the offset will change during the Hall plate's lifetime, making continuous compensation of the offset imperative. The spinning-current Hall plate described in this article can be used to achieve continuous offset compensation. Application of the spinning-current offset reduction method makes it possible to separate the spatially periodic offset from the nonperiodic Hall effect. Experiments on octagonal Hall plates with eight contacts are described. The sensitivity, nonlinearity and offset of a number of Hall plates with different diameters and contact sizes are measured. The residual offset of most Hall plates is less than 10 μT.

1. Introduction

The output of a magnetic sensor is a function of the magnetic field at the position of the sensor. Using a permanent magnet in combination with the magnetic sensor makes it possible to measure the position or realize a switching function.[1] Very sensitive magnetic sensors can measure small fields (like the earth's magnetic field), and may be used to realize an electronic compass. The magnetic fields can be measured by a variety of devices, such as magnetoresistors, magnetotransistors or Hall plates.