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A Study on the Position Signal Compensation Control Technique of Hall Sensor Generated by Uneven Magnetic Flux Density

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BLDC motors and controllers are used in many industrial fields due to the decline of permanent magnet price and the lower cost semiconductor devices. The BLDC motor is easy to maintain as compared to the DC motor and has the advantage of small size, high power, low noise, etc. The BLDC motor is generally used a lot of 120degree energizing method. Also, this motor is commonly controlled by a Hall sensor, which is a relatively low-resolution position sensor, or by a sensorless control method, which is controlled without a position sensor.The hall sensor detects the magnetic field generated by the magnet inserted in the rotor of the motor and uses it as a position signal.When the hall sensor is used for control, the energizing period of the BLDC motor is determined by the position signals of the three hall sensors. These hall sensors detect the position of the rotor by attaching three hall sensors to the rotor at intervals of 120 degrees. However, there may be an error in the mounting position of the hall sensor. The incorrect energizing interval is caused by the mounting position error of the hall sensor. In this paper, the phenomenon of incorrect energizing interval due to the mounting position error of the hall sensor is analyzed. The value of this error is derived as an equation and an algorithm that compensates for the error value is studied. In addition, the maintenance of accurate energization interval is verified even though Hall sensor has the positional error. Therefore this paper provides the quantitative analysis of the error by the mounting position error of the hall sensor and the effectiveness of the algorithm which can compensate for the error.

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