

雑誌名	Proceedings of "2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)"	巻		発行年	2020
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Development of Magnetic Absolute Encoder Using Eccentric Structure: Improvement of Resolution by Multi-Polarization

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Abstract

Encoders that determine the accuracy of motor control requires high reliability and high accuracy. Above all, the optical encoders can commonly easily achieve high resolution. However, it is not desirable to use it in harsh environments because it is susceptible to dust and oil. On the other hand, magnetic encoders are highly reliable in such environments, but their accuracy is inferior. Multi-polarization of magnet is known as one of the means for improving the resolution of magnetic encoders. However, the increase in the number of poles makes it impossible to calculate the absolute angle.

In order to solve this problem, an eccentric structure can be used. The use of the eccentric structure realizes the calculation of the absolute angle even if the magnet is multi-polarized. The purpose of this paper is to multipolarize the magnet more than existing researches, and to realize the calculation of the absolute angle and high accuracy at the same time. The effect of multi-polarization and the number of Hall ICs on the angle error were clarified.

In conclusion, it was demonstrated that Hall ICs for the number of poles are necessary because the angle error increases with the multi-polarization of the magnet. As an outlook, the authors plan to propose an angle calculation method that can handle multi-polarization regardless of the number of Hall ICs.

■理工学研究所との関連

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		研究種目	共同研究第Ⅱ類		
研究課題	Intelligent Servo Actuators に関する研究				