

雑誌名	<i>Proceedings of "IECON 2018 – 44th Annual Conference of the IEEE Industrial Electronics Society"</i>	巻		発行年	2018
		ページ	3764–3769		
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Evaluation of Magnetic Absolute Encoder Using an Eccentric Structure with Feedback Correction

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Abstract

Recently, a field of the servomotors is enlarged in robotics, automobile, and medical applications. In addition, requirements of the servomotors have been changed. Among them, demands of motors for downsizing, high accuracy and high functionality are increasing. However, it is difficult to achieve downsizing of the sensors for controlling the motor and the high accuracy and intelligent functions simultaneously. Therefore, the authors propose a magnetic encoder with realizing small size and high precision. This sensor can easily achieve reduction of the size and high resolution. The accuracy of the encoder can be doubled compared with the conventional structure by changing the number of poles of the magnet from the two poles to the four poles.

However, it becomes difficult to detect the absolute angle by the conventional method. Therefore, the authors use the eccentric rotation of the sensor magnet, for the novel absolute angle detection methods. This research describes the new method of calculating the absolute angle and the experimental results for the accurate measurements of the magnetic absolute encoder.

Accuracy of the developed magnetic encoder reached 14-bit. The proposed structure realizes the absolute angle simultaneous detection.

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