

Effect of inductive coil shape on sensing performance of linear displacement sensor using thin inductive coil and pattern guide

ABSTRACT

This paper discusses the effect of inductive coil shape on the sensing performance of a linear displacement sensor. The linear displacement sensor consists of a thin type inductive coil with a thin pattern guide, thus being suitable for tiny space applications. The position can be detected by measuring the inductance of the inductive coil. At each position due to the change in inductive coil area facing the pattern guide the value of inductance is different. Therefore, the objective of this research is to study various inductive coil pattern shapes and to propose the pattern that can achieve good sensing performance. Various shapes of meander, triangular type meander, square and circle shape with different turn number of inductive coils are examined in this study. The inductance is measured with the sensor sensitivity and linearity as a performance evaluation parameter of the sensor. In conclusion, each inductive coil shape has its own advantages and disadvantages. For instance, the circle shape inductive coil produces high sensitivity with a low linearity response. Meanwhile, the square shape inductive coil has a medium sensitivity with higher linearity.

Keyword: Circle shape; Inductance; Inductive coil; Linear displacement sensor; Linearity; Meander shape; Pattern guide; Sensitivity; Square shape; Triangular type meander shape