

## Properties of flexible support table for fine positioning by magnetic attraction controlled

It is effective to reduce sliding frictions to improve fine positioning abilities. On the other hand, flexible supports are advantageous for securing rigidity. Therefore, in the present study, we developed the uniaxial flexible support table for fine-positioning that is actuated by attraction forces between electromagnets and permanent magnets. By installed two pairs of electromagnets and permanent magnets, the expected advantage of this apparatus is possible to output a displacement for a long stroke, a high resolution and cooperated the two. On this occasion, based on the calibration of attraction force and the stiffness analysis of the flexible support mechanism, a moving displacement of the table for applied to electromagnets was estimated. Then, referring to those estimated results, three kinds of materials with different Young's modules: A2017, C5191 and SUS303 were adopted as the flexible support mechanism, and the apparatus was developed. When positioning experiments with step responses were conducted, step-wise displacements were recognized. The maximum displacement with long stroke positioning was  $108\mu\text{m}$ (A2017), and the minimum displacement with high resolution positioning was  $58\text{nm}$ (SUS303). In addition, when C5191 material was installed for the flexible support mechanism and experimented cooperation positioning, a displacement for a long stroke and for a high resolution were equivalent to the case where the respective positioning was made separately.