

# Variable Flux-path Control Magnetic Suspension System

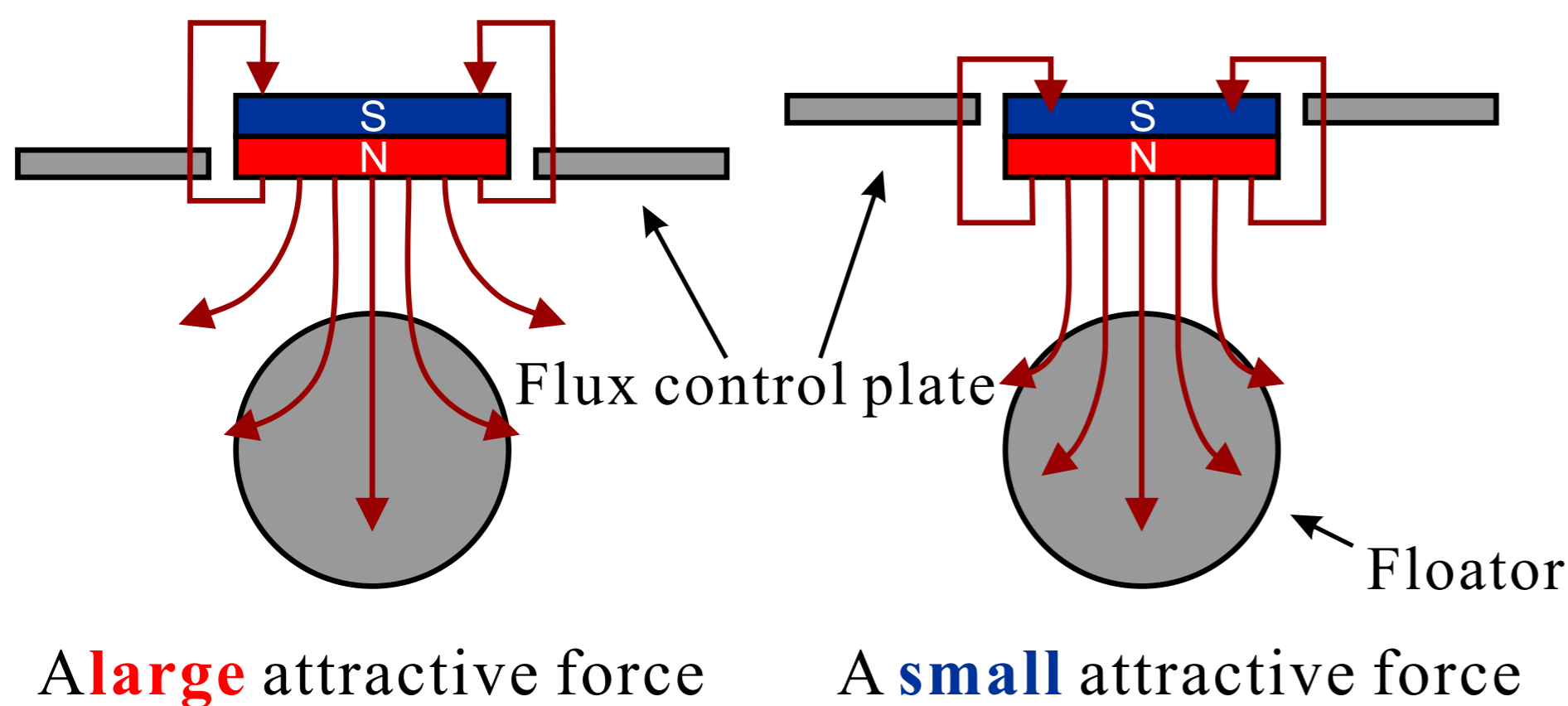
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### Abstract

Magnetic suspension is a technology of suspending an object using magnetic force without any contact. Various applications are possible by taking advantage of such noncontact properties. There are various methods of magnetic suspension that are classified according to ways of generating field force to support and material of the suspended body. One method is to use a permanent magnet as a magnetic source and a control flux-path mechanically. In this approach, the amount of flux reaching the floator from the permanent magnet is controlled with a mechanism. In addition, there are several methods of controlling the flux path. Among them, *laterally controlled type* is described.

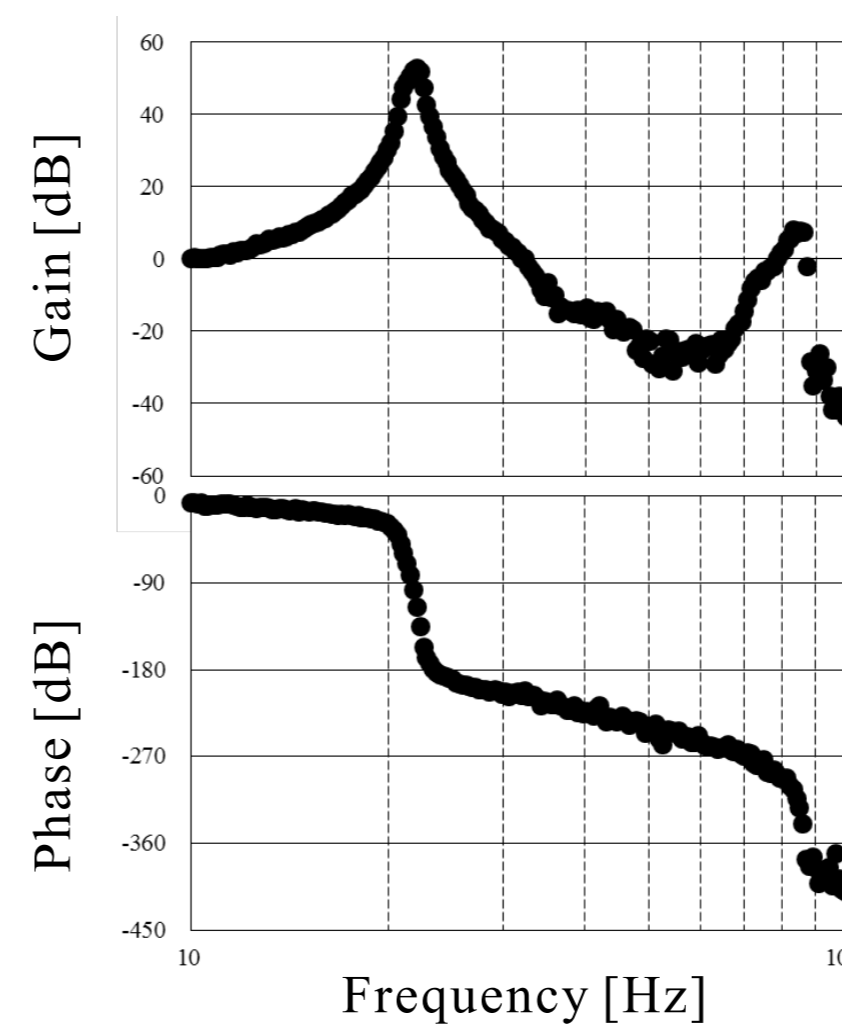
### Introduction



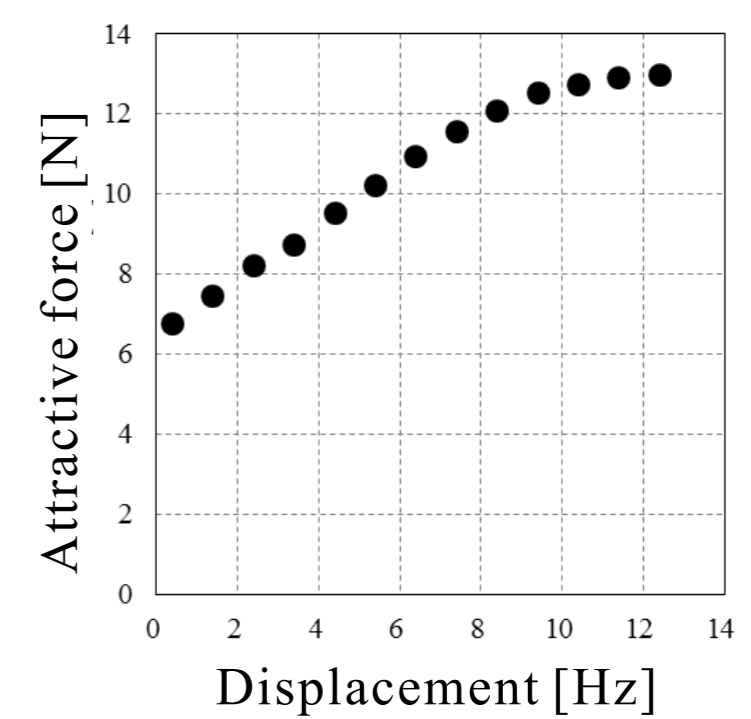
A variation of the attractive force acting on the floator is generated by the moving flux control plate.

**A stable suspension is achieved** by moving the flux control plate dynamically according to the motion of the floator.

### Experimental result



Frequency response of flux control mechanism

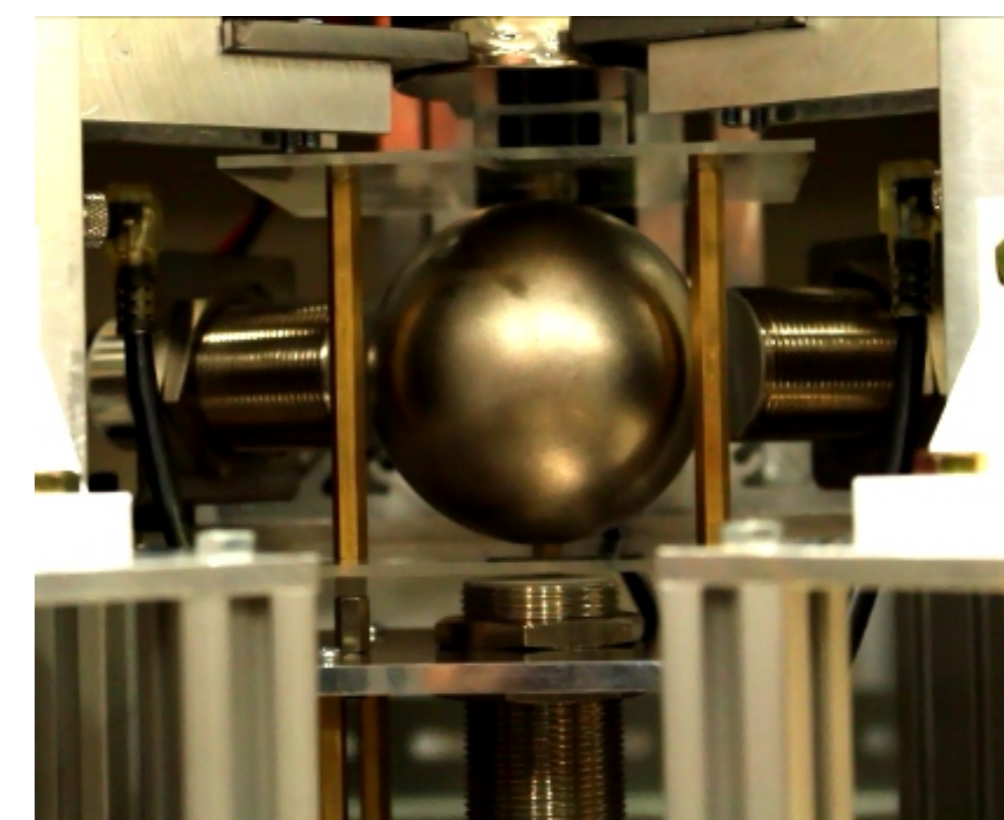
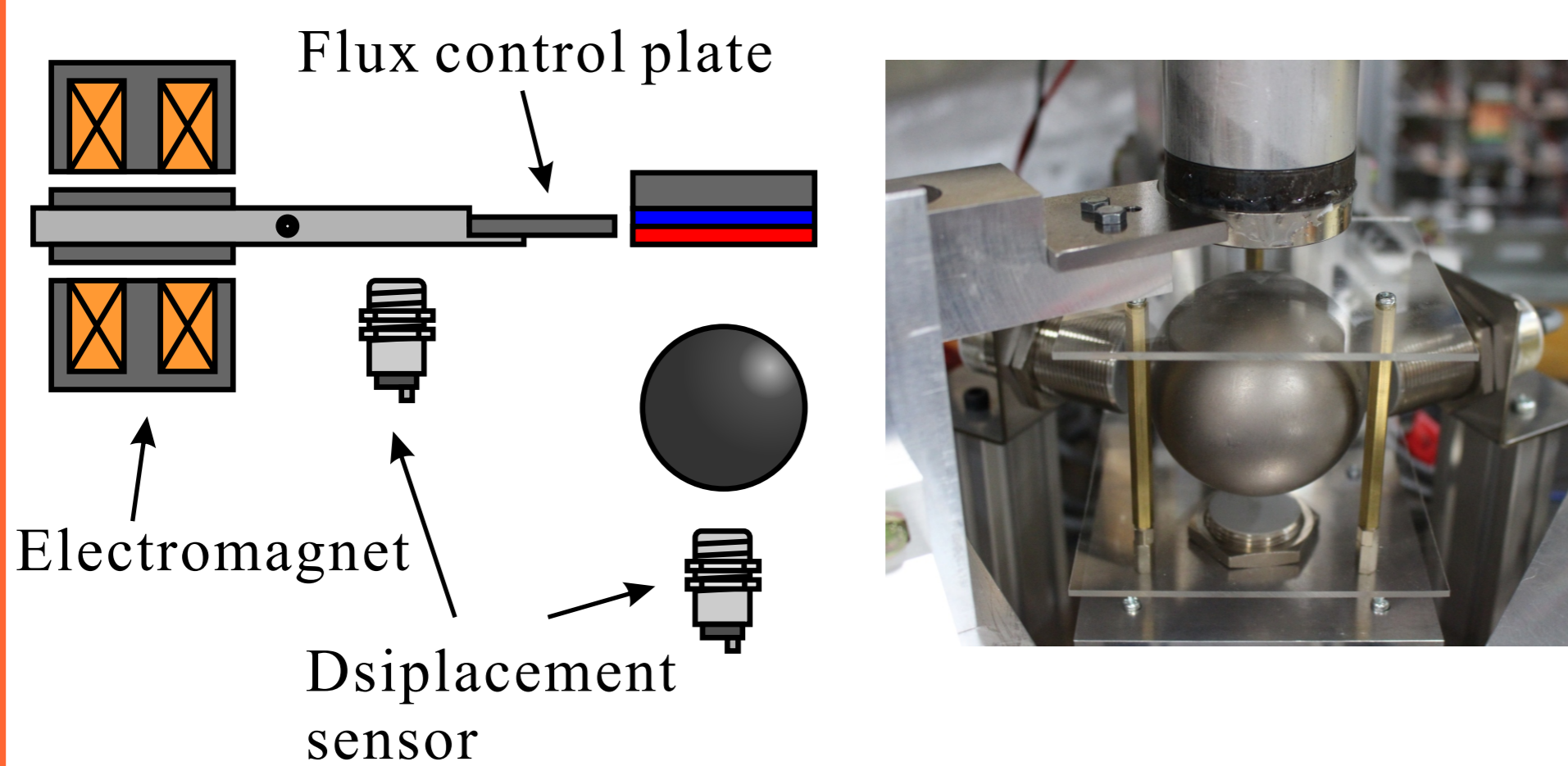


Attractive force when the control plate is moved in the vertical direction

A bandwidth of mechanism : 32 [Hz]

A variation of the attractive force : 0.7 [N/mm]

### Experimental apparatus



State of suspension



Flux control plate : iron  
Actuator : Electromagnet

The apparatus has three actuators to achieve **3-DOF suspension**.

### Conclusion

In the magnetic suspension system using laterally control flux-path mechanism, the variation of the attractive force is investigated experimentally. The apparatus for magnetic suspension is designed and fabricated. 1-DOF suspension is achieved in the proposed system.