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Research paper

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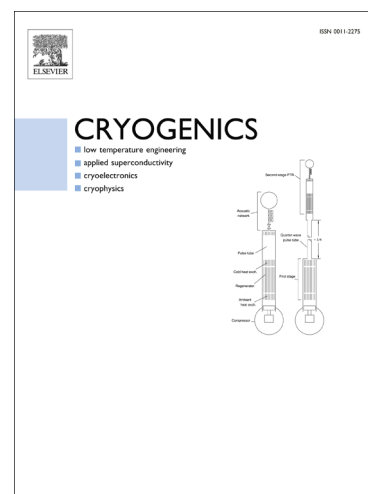
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## The size effect on the magnetic levitation force of MgB<sub>2</sub> bulk superconductors

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### Abstract

In this study, the size effect on the magnetic levitation performance of disk-shaped MgB<sub>2</sub> bulk superconductors and permanent magnets was investigated. MgB<sub>2</sub> samples with varying diameters of 13 mm, 15 mm and 18 mm, each of which were 2g in mass, were prepared by two-step solid state reaction method. Vertical levitation force measurements under both zero-field-cooled (ZFC) and field-cooled (FC) regimes were carried out at different temperatures of 20, 24 and 28 K. It was determined that the levitation force of the MgB<sub>2</sub> strongly depends on both the diameters of the sample and the permanent magnet. In ZFC regime, the maximum levitation force value for the permanent magnet and the sample 18 mm in diameters reached to the 8.41 N at 20 K. In addition, in FC regime, attractive and repulsive force increased with increasing diameters of the sample and the permanent magnet. In that, the sample with 18 mm in diameter showed the highest attractive force value -3.46 N at 20 K and FC regime. The results obtained in this study are very useful in magnetic levitation devices as there is no detailed study on the size of superconductors and permanent magnets.

**Keywords:** Bulk superconductor; MgB<sub>2</sub>, Levitation force; Attractive and repulsive force; Permanent magnets

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