

Measurement of the geomagnetic horizontal component with a neodymium magnet

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In this study, we aimed to establish a new way to measure the earth's magnetic field without external power sources. When a neodymium magnet suspended by a sewing thread oscillates freely, the oscillation period is determined using the value of geomagnetic horizontal component, inertia moment, and magnetic moment. We determined the magnetic moment on the neodymium magnet through two different methods and measured the oscillation period with a smartphone all over the world. The results showed that geomagnetic horizontal component was inverse proportional to the oscillation period squared, which agreed with the prediction from the formula which we established based on simple harmonic oscillation. We found that the geomagnetic horizontal component could be measured without external power sources, using a neodymium magnet that has already known magnetic moment. This method can be applied to measure the magnetic field in the cosmic space.

Keywords: earth's magnetic field, neodymium magnet, magnetic moment