

On the design of a relative gravimeter using diamagnetism

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Most of the currently available relative gravimeters are based on mechanical spring suspension. Magnetic levitation is a promising method for replacing the principle of suspension in the relative gravimeters, being free from the problems inherent to mechanical springs. The superconducting gravimeter, manufactured by GWR Instruments, is an example of such instruments that utilizes magnetic suspension, and achieves very high sensitivity and stability in a cryogenic environment. General diamagnetic (not superconducting) materials can also be used to realize magnetic levitation at room temperature; it is possible either to levitate a permanent magnet stably with the aid of diamagnetic support or to levitate a diamagnetic material stably with permanent magnets. We will discuss basic ideas and feasibility of relative gravimeters based on magnetic suspension, and present some preliminary results of numerical simulations for designing a gravity sensor with diamagnetism.

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