

Magnetic Compensation of Gravity by Using Superconducting Axisymmetric Coils: Spherical Harmonics Method

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Abstract - It is important for space research to study the behavior of fluids such as liquid oxygen and liquid hydrogen under weightless conditions (microgravity). In addition, since 1991 some magnetic ground-based stations have allowed compensating gravity and meeting space conditions. Magnetic devices allow low-cost microgravity experiments with unlimited time. The goal of these techniques is to reach the same or better conditions (residual acceleration of the studied fluid) than those during parabolic flights. In this paper, several specific distributions of the magnetic field are determined. These distributions allow compensating gravity by means of axisymmetric coils (solenoids). This paper introduces several distributions of the residual forces useful for different kinds of microgravity experiments.

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