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Mathematical Modeling of the Working Principle of Gravity Gradient Instrument

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Abstract : Gravity field is of great significance in geoscience, national economy and national security, and gravitational gradient measurement has been extensively studied due to its higher accuracy than gravity measurement. Gravity gradient sensor, being one of core devices of the gravity gradient instrument, plays a key role in measuring accuracy. Therefore, this paper starts from analyzing the working principle of the gravity gradient sensor by Newton's law, and then considers the relative motion between inertial and non-inertial systems to build a relatively adequate mathematical model, laying a foundation for the measurement error calibration, measurement accuracy improvement.

Keywords : gravity gradient, gravity gradient sensor, accelerometer, single-axis rotation modulation
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