



STRING GRAVITY GRADIOMETER: NOISE, ERROR ANALYSIS AND APPLICATIONS

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String Gravity Gradiometer Module (SGGM) is an electro-mechanical device designed to measure minute variations of a vector component of gravitational acceleration along an orthogonal spatial direction determined by "String". In other words, it is designed to measure an off-diagonal gravity gradient in its own local coordinate frame. "String" means a single coherent elongated mechanical element, which is the primary transducer of SGGM. Its main function is to link a gravity gradient with a mechanical deformation, which then can be detected by a secondary mechanical-displacement-to-voltage transducer. The latter provides input to a signal processing hardware. "String" is subject to some specific boundary conditions, which are physically imposed upon the "String". This limits the number of its mechanical degrees of freedom to practically the only one that is coupled to a desired signal. Pulse Feedback Modulation technique has been developed as a replacement to classic rotating gradiometer designs, which provides an alternating gradiometer output in proportion to a static input. More complex systems can be built from several SGGMs allowing such instruments to simultaneously detect a number of different gravity gradients including a Full Tensor system. Noise limitations, error analysis and possible applications of SGGMs are discussed.