

Gravitation exploration as an estimation procedure of a causative position

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In this study, we propose a new method for estimating the location of a causative body based on the relationship between the body and its three gravitational vector components. The relationship was derived based on the fact that the angle between the observation points of gravitation and the causative body is equal to the angle between the horizontal and vertical vectors of gravitation, and a non-linear equation was obtained. Accordingly, the location of a causative body can be estimated by using a non-linear least square method such as the Gauss-Newton method. Our proposed method is not an inversion method but belongs to the category of semi-automatic interpretation methods such as Euler deconvolution. However, additional information such as the structural index in Euler deconvolution is not required for the calculations in this method, and the location of the causative body can be estimated by providing only the window size for the analysis. In order to confirm the efficacy of this method, we conducted numerical tests using a simple sphere model and a rectangular model. While according to the tests in the sphere model, the 3-D location of the body was estimated correctly, the rectangular model showed the shape to have been estimated correctly. A comparison of the results by this method with those by Euler deconvolution showed the depth estimated by the former to be higher than that obtained by the latter.

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