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The Method of Curvature Attribute applied in the Depth Inversion of the Geological Bodies Edge by Potential Field Data

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It is vital to quickly and effectively determine the extent and depth of geological body by using potential field data in gravity and magnetic survey. In this study, three key techniques studying the extent and depth of geological sources based on curvature attribute are studied: the optimal solutions to the objective function, the edge of geological bodies and picking out solutions. Firstly, the optimal solution to the objective function is studied, that is, the key extraction algorithm about the curvature attribute. The Huber norm is introduced into the extraction algorithm of curvature attribute, which more accurately detect the depth of edge of the geological bodies. Secondly, the normalized vertical derivative of the total horizontal derivative (NVDR-THDR) technique is introduced into curvature attribute, which shows more continuous results about the edge position of the geological bodies and more sensitive to the small-scale tectonic structure. Finally, we study the way to pick out the inversion solution, that is, to solve the multi-solution equations in the inversion. The upward continuation of a certain height with strict physical significance was introduced into the inversion method, which was used to suppress the noise, and the final and actual inversion depth was equal to the inversion depth minus the height of upward continuation. And the average value of threshold limitation technology of the potential fields data was also introduced into this method. Using the two technologies, solutions of non-field source edge positions were eliminated, and make the inversion solutions closer to the actual situation. Through the above three key techniques, the accuracy, continuity and recognition to the small-scale structure of the inversion result are optimized. The theoretical models are used to verify the effectiveness of the above key technologies, the results show that the three key technologies have achieved good results, and the combined models are used to verify the effectiveness of the optimized inversion method. The measured aeromagnetic data were used to inversing the edge depth of the intrusive rock in a mining area, and the inversion results are in good agreement with the rock depth revealed by borehole.