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识别断裂构造的DCT法

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摘要 为了提高欧拉反褶积（Euler法）的反演精度，提出基于DCT的Euler法确定断层断点位置的反演方法，从理论上给出了基于DCT的Euler齐次方程，指出异常导数的计算精度是影响Euler法反演精度的核心问题.台阶模型实验证实：用DCT法计算的重力异常垂向一阶导数的最大误差为$0.460\times10^{-9}/s^2$，均方差为$0.189\times10^{-9}/s^2$，水平导数最大误差为$0.182\times10^{-9}/s^2$，均方差为$0.028\times10^{-9}/s^2$，与DFT法相比，其计算的异常导数具有很高的精度.通过对正演模型的计算，确定了基于DCT的Euler法模型反演的位置为台阶断面的中心点位，与理论点位相对应；在反演模型实验中，证实了DCT法具有较高的反演精度，同时在实际应用中，进一步验证了该法的可行性、实用性和准确性.

关键词 断裂构造,DCT法, Euler反褶积,异常导数,反演精度

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The DCT method of identifying faulted structures

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Abstract The paper proposes an inversion method that determines locations of faulted structures using the Euler deconvolution (Euler method) based on discrete cosine transform (DCT) to improve the inversion precision of Euler's method. We give the Euler's homogeneity equation based DCT and point out that the calculating accuracy of gravity anomalies derivatives is significant question which influence the inversion precision of Euler method. Experiments of step models show that the maximum error and standard deviation of vertical first derivative calculated by DCT are $0.460\times10^{-9}/s^2$ and $0.189\times10^{-9}/s^2$ respectively, and that of horizontal first derivative are $0.182\times10^{-9}/s^2$ and $0.028\times10^{-9}/s^2$. It is demonstrated that the accuracy of gravity anomalies derivatives calculated by DCT is excellent to compare with DFT. Through computing for forward models, we determine that the locations inversed by Euler method based on DCT are center of fractured surface of steps, in which the points is consistent with theoretical locations. It is shown in the experiment of inversion models that the precisions inversed by DCT method are very high, and validated in the practical application that the method is feasible, practicable and veracious.

Key words faulted structure DCT method euler deconvolution anomaly derivative inversion precision

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