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位场总水平导数极值位置空间变化规律研究

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Spatial variation law of the extreme value positions of total horizontal derivative for potential field

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摘要

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摘要 通过对位场总水平导数函数性质的研究表明,位场总水平导数不是位函数,因而利用位场总水平导数构造新的边缘识别方法,使得计算结果的稳定性下降.对单一边界、双边界、多边界模型重力异常总水平导数和重力异常垂向导数总水平导数的空间变化规律研究表明,重力异常垂向导数总水平导数和化极磁力异常总水平导数的极值位置相同,与重力异常总水平导数空间变化规律相似.利用位场总水平导数极大值位置能够准确识别单一垂直边界地质体的边缘位置,但不能准确识别其它任何边缘位置,其识别结果的偏移量大小随地质体的埋深、水平尺寸以及倾斜程度等变化,但能收敛于某一固定值;重力异常垂向导数比重力异常总水平导数的峰值更加尖锐、横向识别能力更强,其极大值位置更靠近地质体上顶面边缘位置,但存在“次极大值”影响.

关键词: 总水平导数 垂向导数总水平导数 极值位置 空间变化规律 位函数性质 边缘位置 次极大值

Abstract: In this paper, the function properties of the total horizontal derivative (THDR) of the potential field were studied. The results show that the THDR of potential field is not a potential function, so the new edge recognition method based on the THDR may have the incalculable "singularities", which will make the stability of the calculation results decreased. I studied the spatial variation law of the extreme value position of the THDR and the horizontal derivative of vertical derivative (VDR_THDR) of gravity anomalies based on the single-border, double-boundary and multi-boundary models. The results show that the VDR_THDR has the same extreme value position with the THDR of the magnetic anomalies reduced to the pole and the similar spatial variation law of the extreme value positions with the THDR of gravity anomalies. By the extreme value position of the THDR of the potential field, we can identify the edge position of the single vertical geological body accurately. But the above method can not identify the edge position accurately for any other geological bodies, because the offset of the recognition result varies with the depth, the horizontal size and the inclination degree of the geological body and converges to a fixed value finally. The extreme value peak of the VDR_THDR is sharper than that of the THDR and has more powerful recognition ability in horizontal direction. The extreme value position of the VDR_THDR is closer to geological body top edge in contrast to the extreme value position of the THDR, but influenced by the "second maximum".

Keywords: total horizontal derivative total horizontal derivative of vertical derivative position of extreme value spatial variation law property of potential function edge position second maximum

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