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基于异常线圈的时间域AEM系统测试和标定方法研究

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A study on time-domain AEM testing and calibration method based on anomaly loop

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摘要	参考文献	相关文章

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摘要　为了检验和测试时间域航空电磁系统的测量精度和有效性,采用地面铺设闭合的异常线圈模拟地下有限导体的方法,将异常线圈的电磁响应理论值与系统实测数据进行拟合分析,来确定系统误差和飞行几何参数误差.在计算异常线圈电磁响应的基础上,研究了衰减曲线、剖面曲线与线圈的电性、几何参数关系,设计了野外测试实验方案.在长春市大鹅岛附近,采用吊车进行了系统测试,测试结果表明:单点实测数据的平均绝对误差为0.48 mV,系统相对误差小于1%,飞行高度误差为0.4 m、水平偏移误差为0.2 m.基于异常线圈进行时间域航空电磁系统的测试和标定,是一种准确、快速、经济可行的方法,具有野外施工便捷、参数调整灵活等特点,适用于任何时间域电磁测量系统的检测.

关键词：　时间域航空电磁系统　异常线圈　时间常数　系统误差　几何参数误差

Abstract：　To verify the measurement accuracy and effectiveness of airborne time domain electromagnetic system(AEM), this paper provides a method to simulate the underground finite conductor using closed anomaly loop placed on the ground. System error and flight geometric parameter error can be determined by the fitting analysis of the theoretical electromagnetic response value and the measured data. On the basis of closed anomaly loop electromagnetic response calculation, we study the relationship among decay curve, profile curve, the loop electrical properties and the geometric parameters, and design a field experimental plan. To test this plan, we do field experiment utilizing a crane near the DaEDao in Changchun, the final results show that the average absolute error of the single measured data is 0.48 mV, the system relative error is less than 1%, the flight altitude error is 0.4 m, and the horizontal offset error is 0.2 m. It is an accurate, fast, economical and feasible method to test and calibrate the AEM system by using closed anomaly loop placed on the ground. This simulation method has some advantages, such as convenient field construction and flexible parameter adjustment, and the proposed method is suitable for testing many kinds of AEM system.

Keywords：　Airborne time domain electromagnetic system (AEM)　Closed anomaly loop　Time constant　Systematic error　Geometrical parameter error

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