

探针式传感器测试系统设计及数据处理算法研究

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摘要：

为了提高线源模型的工程应用效率，文中研究和探讨了基于线源模型的探针式传感器测试系统和数据处理的算法，首先简要的介绍了探针式传感器制作原理，其次基于无线传感器Sun SPOT，研究探针测试系统的设计，并在测量电路上提出了一种新的线性电桥测试电阻的方案；在数据处理上，采用反问题分析方法，提出了一种新的求解算法—区间粒子算法求解，研究了算法实现的基本步骤和参数设置问题，并通过模拟数据和实测数据分别检验了算法求解准确性。最后实验和计算表明系统测试快捷便利于野外测试，测试数据准确可靠，算法求解精度高、收敛速度快和计算稳定。

关键词：探针式传感器，数据处理，反问题数值求解，区间粒子算法

Design of Probe Sensor Measuring System and Research of Data Processing Algorithm

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Abstract:

In the paper, in order to improve to the application efficiency of line source model, the probe sensor measuring system designing and data processing algorithm are researched. Firstly a brief introduction to the principles of the probe sensor is given, secondly, based on the wireless sensor platform Sun SPOT, the measurement circuit of the linear resistance test bridge is designed for the probe test system; and the inverse problem analysis methods is adopted for the data processing, interval particle algorithm which is a new algorithm is proposed for solving the inverse problem of line source, the basic steps and parameter setting problems of algorithm are given, the simulated and measured data are used to test and verify the accurate of the algorithm. Finally, experiments and calculations show that the measuring system is efficient and convenient to facilitate field testing, the measured data is accurate, reliable and data processing result of the algorithm is precision, fast convergence and computational stability.

Keywords: probe sensor, data process, inverse problem numerical solution, range particle algorithm

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