



分布式多参数高密度电磁探测系统

Distributed multi-parameter high-density electromagnetic detecting system

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研制出实用化的分布式多参数高密度电磁探测仪器（发射机，接收机，磁场传感器）。开发了抗干扰的数据处理与弱信息提取技术，当以 50Hz 及其谐波为主的工频电力干扰大于有效信号 1000 倍时，仍可获取达到质量要求的可控源音频大地电磁测量数据。研究了大地电磁、可控源音频大地电磁、谱激电的正反演模拟和并行计算方法，集成了集数据管理、数据图示、人机交互建模与正反演处理的解释软件。发表科技论文 10 篇，其中 SCI 检索 3 篇；申请发明专利 4 项，其中获得授权发明专利 2 项；培养国土资源部第一批杰出青年科技人才 1 人。

Practical distributed multi-parameter high-density electromagnetic detecting instruments (transmitter, receiver, magnetic field sensor), and anti-interference data processing and weak information extraction techniques were developed. When the electric interference whose power frequency is 50Hz and dominated by harmonic wave is over 1000 times of effective signal, the controlled source audio-frequency magnetotelluric measurement data that reach quality requirements can be still obtained. The forward and inverse simulations and parallel computing methods about the magnetotellurics (MT), controlled source audio-frequency magnetotellurics (CSAMT) and spectral induced polarization (SIP) were studied, and an interpretation software integrating data management, graphical data, human-computer interaction modeling, and forward and inverse simulations was developed. 10 scientific papers were published, including 3 papers on SCI Journal List; 4 invention patents were applied, among which two patents were granted; one of the first group of young outstanding talents of the Ministry of Land and Resources was cultivated.

大功率发射机主要技术指标

Main Technical Specifications of High-power Transmitter

- 最高电压 (Maximum Voltage): 1200V
- 最大电流 (Maximum Current): 50A
- 最大发射功率 (Maximum Transmit Power): 60KW
- 发射频率范围 (Transmitting Frequency Range): 0.01Hz-8000Hz
- GPS 同步精度 (Synchronization Precision): 0.1μs



多功能接收机主要技术指标

Main Technical Specifications of Multi-function receiver

- 频带范围 (Frequency Range): 0.01Hz-8KHz
- 动态范围 (Dynamic Range): 120dB
- GPS 同步精度 (Synchronization Precision): 0.1μs



感应式磁场传感器主要技术指标

Main Technical Specifications of Induction Magnetometer

- 频带范围 (Frequency Range): 0.1Hz-10KHz
- 传感器噪声 (Noise of Sensor): $5 \times 10^{-5} \text{ nT}/\sqrt{\text{Hz}}$ @10Hz
- 灵敏度 (Sensitivity): 100mV/nT
- 重量 (Weight): 3.6kg

