

<<应用反问题中的计算方法>>

图书基本信息

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### 内容概要

The book covers many directions in the modern theory of inverse and illposed problems : mathematical physics , optimal inverse design , inverse scattering , inverse vibration , biomedical imaging , oceanography , seismic imaging and remote sensing ; methods including standard regularization , parallel computing for multidimensional problems , Nystr6m method , numerical differentiation , analytic continuation , perturbation regularization , filtering , optimization and sparse solving methods are fully addressed.

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## 章节摘录

版权页：插图： The harmonic Bz algorithm for the reconstruction of conductivity applies  $B$ , the Laplacian operation of magnetic flux, as input data, rather than  $B_z$ . Of course, this algorithm amplifies the noise in the measurement data  $B_z$  obviously. Thus the performance of the harmonic Bz algorithm could deteriorate if the noise in the measurement of  $B_z$  is not so small, which is the practical case of MREIT. To deal with this noise problem, some algorithms were developed in order to weaken the ill-posedness of the harmonic Bz algorithm, such as the gradient Bz decomposition algorithm and variational gradient Bz algorithm, which need the first order derivative of  $B_z$  only. Although the noise amplification problem is weakened in some senses in these two schemes, the first order derivative of  $B_z$  is still needed. Due to these difficulties in treating with the derivative of the measurement data  $B_z$ , it is preferable to establish an image reconstruction algorithm using the magnetic flux density data directly, rather than its derivative. Recently, we proposed an integral equation method, where the conductivity was reconstructed from the  $B_z$  data directly, see (14.2.7) in the next section. The validity of the integral equation method was shown by some numerical simulations in. In this chapter we will review MREIT from mathematical models, imaging reconstruction algorithms to its numerical simulations. In section 14.2, the mathematical models of the forward problem and inverse problem in MREIT are described in details. Since the imaging reconstruction algorithms are the key to the practical applications of MREIT technique, two specific algorithms: the harmonic Bz algorithm and the integral equation method are discussed in Section 14.3 and Section 14.4, respectively. In the last section, we give some numerical simulations to show the validity of the above image reconstruction algorithms.

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### 编辑推荐

《应用反问题中的计算方法(英文版)》可作为高等学校环境科学、环境工程和其他相关专业的本科生教学用书及研究生与博士生的参考书。

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