



Inverse Problems in Physical Diagnostics

By Konstantin P Gaikovich

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Unlike direct problems related to the solution of differential equations, inverse problems are typically expressed by integral equations. These equations relate media parameters to parameters of a measured signal, or input parameters to output ones in various measurement systems. The solution of integral equations is, with few exceptions, an ill-posed problem, and additional a priori information about the exact solution should be used to solve such problems. The specific character of the a priori information determines various regularisation methods that are in use here to obtain an approximate solution: Tikhonov's method, statistical regularisation method, methods based on the use of additional equations or restrictions or of models with limited number of unknown parameters. The main point of this book is the study of convergence properties of each method and the wide application of numerical modelling that gives the accuracy of the solution in a chosen metric. It is an unaccustomed procedure for physicists, but, because there is no proportionality between data and solution errors in ill-posed problems, such approach is inevitable.

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Inverse Problems in Physical Diagnostics By Konstantin P Gaikovich Bibliography

- Rank: #17996996 in Books
- Brand: Nova Science Pub Inc
- Published on: 2004-12-01
- Original language: English
- Number of items: 1
- Dimensions: 10.50" h x 7.50" w x 1.25" l, .0 pounds
- Binding: Hardcover
- 372 pages

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