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VALUABLE CONTRIBUTION TO THE HIGHLY TOPICAL FIELD OF COMPUTATIONAL INVERSE PROBLEMS INVERSE PROBLEMS ARE UBIQUITOUS IN SCIENCE AND ENGINEERING AND HAVE RIGHTFULLY RECEIVED A GREAT DEAL OF ATTENTION BY APPLIED MATHEMATICIANS STATISTICIANS AND ENGINEERS SINCE MOST INVERSE PROBLEMS CANNOT BE SOLVED ANALYTICALLY COMPUTATIONAL METHODS PLAY A FUNDAMENTAL ROLE INVERSE PROBLEM APPROACHES OFTEN CALLED INVERSE MODELING IN ENGINEERING HAVE BECOME A KEY TECHNIQUE TO RECOVER QUANTITATIVE INFORMATION IN MANY BRANCHES OF SCIENCE PROMINENT EXAMPLES INCLUDE MEDICAL IMAGE RECONSTRUCTION NONDESTRUCTIVE MATERIAL TESTING SEISMIC IMAGING AND REMOTE SENSING THE ARTICLE DISCUSSES THE DISCRETIZATION OF LINEAR INVERSE PROBLEMS WHEN AN INVERSE PROBLEM IS FORMULATED IN TERMS OF INFINITE DIMENSIONAL FUNCTION SPACES AND THEN DISCRETIZED FOR COMPUTATIONAL PURPOSES A DISCRETIZATION ERROR APPEARS OVERVIEW EDITORS YANFEI WANG CHANGCHUN YANG ANATOLY G YAGOLA FIRST BOOK RELATING THE INVERSION THEORY AND RECENT DEVELOPMENTS WITH REAL APPLICATIONS COMBINES OPTIMIZATION AND REGULARIZATION FOR SOLVING INVERSE PROBLEMS COVERS FRONTIERS ON MULTI DISCIPLINARY SUBJECTS AREAS 32k ACCESSES DESCRIPTION COMPANION WEBSITE LINK INVERSE PROBLEMS ARISE IN A NUMBER OF IMPORTANT PRACTICAL APPLICATIONS RANGING FROM BIOMEDICAL IMAGING TO SEISMIC PROSPECTING THIS BOOK PROVIDES THE READER WITH A BASIC UNDERSTANDING OF BOTH THE UNDERLYING MATHEMATICS AND THE COMPUTATIONAL METHODS USED TO SOLVE INVERSE PROBLEMS BIBTEX TOOLS ABSTRACT PRACTICAL INVERSE PROBLEMS INVOLVE MEASURED DATA WHICH IS INEXACT STATISTICAL MODELS PROVIDE A RIGOROUS EFFECTIVE MEANS WITH WHICH TO DEAL WITH MEASUREMENT ERROR IN ADDITION STATISTICAL ESTIMATION TECHNIQUES CAN PROVIDE USEFUL TOOLS AND INSIGHT INTO REGULARIZATION INVERSE PROBLEMS ARISE FROM THE NEED TO GAIN INFORMATION ABOUT AN UNKNOWN OBJECT OF INTEREST FROM GIVEN INDIRECT MEASUREMENTS INVERSE PROBLEMS HAVE SEVERAL APPLICATIONS VARYING FROM MEDICAL IMAGING AND INDUSTRIAL PROCESS 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PROBLEMS WITH AN EMPHASIS ON MODELING AND COMPUTATIONS THE FRAMEWORK IS THE BAYESIAN PARADIGM WHERE ALL VARIABLES ARE MODELED AS RANDOM VARIABLES THE RANDOMNESS REFLECTING THE DEGREE OF BELIEF OF THEIR VALUES AND THE SOLUTION OF THE 2006 STATISTICAL AND COMPUTATIONAL INVERSE PROBLEMS TECHNOMETRICS VOL 48 NO 1 PP 146 146 SPRINGER PUBLICATION DATE 2005 NUMBER OF PAGES 335 FORMAT HARDCOVER SERIES APPLIED MATHEMATICAL SCIENCES 160 PRICE 69 95 ISBN 0 387 22073 9 CATEGORY MONOGRAPH MAA REVIEW TABLE OF CONTENTS WE DO NOT PLAN TO REVIEW THIS BOOK TAGS INVERSE PROBLEMS LOG IN TO POST COMMENTS THE INVERSE OF MULTIPLYING IS DIVIDING MULTIPLYING CAN BE UNDONE BY DIVIDING EXAMPLE 5 9 45 CAN BE REVERSED BY 45 9 5 IT WORKS THE OTHER WAY AROUND TOO DIVIDING CAN BE UNDONE BY MULTIPLYING EXAMPLE 10 2 5 CAN BE REVERSED BY 5 2 10 THE EASIEST WAY TO GRAPH AN INVERSE FUNCTION IS BY REFLECTING THE ORIGINAL FUNCTION ACROSS THE LINE Y X THIS IS BECAUSE THE INPUTS AND OUTPUTS SWITCH PLACES WHEN WE INVERT A FUNCTION WHERE ARE COMPOSITE AND INVERSE FUNCTIONS USED IN THE REAL WORLD THESE FUNCTIONS ARE USED IN A LOT OF PLACES WE INTRODUCE A NOVEL ADAPTIVE GAUSSIAN PROCESS REGRESSION GPR METHODOLOGY FOR EFFICIENT CONSTRUCTION OF SURROGATE MODELS FOR BAYESIAN INVERSE PROBLEMS WITH EXPENSIVE FORWARD MODEL EVALUATIONS AN ADAPTIVE DESIGN STRATEGY FOCUSES ON OPTIMIZING BOTH THE POSITIONING AND SIMULATION ACCURACY OF TRAINING DATA IN ORDER TO REDUCE THE COMPUTATIONAL COST OF SIMULATING TRAINING DATA WITHOUT

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