

FREE ACCESS DISCRETE INVERSE AND STATE ESTIMATION PROBLEMS WITH GEOPHYSICAL FLUID APPLICATIONS

From Capture to Simulation - Connecting Forward and Inverse Problems in Fluids - From Capture to Simulation - Connecting Forward and Inverse Problems in Fluids by James Gregson 1,203 views 10 years ago 3 minutes, 23 seconds - We explore the connection between **fluid**, capture, simulation and proximal methods, a class of algorithms commonly used for ...

Estimate Velocity | Geolitix How-to - Estimate Velocity | Geolitix How-to by Geolitix 346 views 3 years ago 57 seconds - Learn how to use **estimate**, project velocity in Geolitix. Book your free demo at www.geolitix.com.

2012: Advances in Geophysical Tools for Estimating Hydrologic Parameters and Processes - 2012: Advances in Geophysical Tools for Estimating Hydrologic Parameters and Processes by CUAHSI 178 views 8 years ago 1 hour, 12 minutes - 2012 Fall Cyberseminar Series November 2, 2012 \ "Advances in **Geophysical**, Tools for **Estimating**, Hydrologic Parameters and ...

Introduction

Welcome

Slide

Processes

Challenges

Hightech instrumentation

USGS wellbore data

geophysical tools

geophysics

physical tools

geophysical applications

basinscale GPR

methane gas content

infiltration pond

groundwater surface water exchange

geophysical data

Adam Ward

Mike BSF Anaya

Lee Slater

Airborne geophysics

Groundwater models in Nebraska

Connection predictions

Airborne electromagnetics

Groundwater systems

Integrate geophysical data

State of the practice

Full Waveform Inversion

Full Waveform Inversion Results

Example Data Set

Velocity Model

Cross Gradients

Synthetic Test Model

Conclusion

Lecture 5b Statistical Estimation and Inverse Problems | Digital Image Processing - Lecture 5b Statistical Estimation and Inverse Problems | Digital Image Processing by Prof. Alex Bronstein 637 views 6 years ago 1 hour, 37 minutes - Wiener filter, maximum likelihood and maximum a posteriori estimators, Bayesian estimators.

Inverse problems and estimation

Example: deconvolution

Minimum MSE (MMSE) estimator

Wiener filter

Estimation error

Orthogonality

MMSE deconvolution

Maximum likelihood (ML) estimators

Kullback-Leibler divergence

Inverse problems, data assimilation and methods in dynamics of solid Earth - Inverse problems, data assimilation and methods in dynamics of solid Earth by ICTP Earth System Physics 310 views 3 years ago 1 hour, 6 minutes - Joint ICTP-IUGG Workshop on Data Assimilation and **Inverse Problems**, in **Geophysical Sciences** | (smr 3607) Speaker: Alik ...

Intro

Mathematical model

Direct and inverse problems

Inverse problems

Data assimilation

Data collection

Why data assimilation

Annotation

State the problems

Equations

Backward in time

Backward advection

Variational method

Functional

Mantle plume evolution

Variational technique

Restoration errors

Small noise

Effect of heat diffusion

6. Determine the Θ values that define the shaded region shown. The 2 polar curves are defined by - 6.

Determine the Θ values that define the shaded region shown. The 2 polar curves are defined by by Gerald Dyson No views 1 hour ago 1 minute, 2 seconds - 6. Determine the Θ values that define the shaded regions shown. The 2 polar curves are defined by: $\begin{matrix} \end{matrix}$...

Lecture 5a - Statistical Estimation and Inverse Problems | Digital Image Processing - Lecture 5a - Statistical Estimation and Inverse Problems | Digital Image Processing by Prof. Alex Bronstein 880 views 6 years ago 1 hour, 39 minutes - Random signals and noise, basic notions in statistical **estimation**, **inverse problems**,.

Random variable

Stochastic process (a.k.a random signal or field)

Cumulative distribution function (CDF)

First- and second-order moments

Wide-sense stationarity

Power spectrum density (PSD)

Cross-spectrum

Linear translation equivariant systems

Properties of power spectra

White and colored noise

Masahiro Yamamoto: Inverse problems for fluid dynamics - Masahiro Yamamoto: Inverse problems for fluid dynamics by Centre International de Rencontres Mathématiques 1,455 views 9 years ago 44 minutes - I discuss several types of **inverse problems**, for **fluid**, dynamics such as Navier-Stokes equations. I prove uniqueness and ...

Preliminary Introduction

1. Introduction

Main technique: integration by parts

Carleman estimate for parabolic Lamé system

Unique continuation for 1st order equation

Global Hölder stability

Calderón Problem for Navier-Stokes equations

Global uniqueness: whole Cauchy data

Global uniqueness by partial Cauchy data

Overview

Statement

Theorem 5

Organizers

"Ensemble Kalman Inversion Derivative-Free Optimization" Andrew Mark Stuart - "Ensemble Kalman Inversion Derivative-Free Optimization" Andrew Mark Stuart by ?????e???????????????? 655 views 5 years ago 24 minutes - The 7th International Symposium on Data Assimilation (ISDA2019) "Ensemble Kalman Inversion Derivative-Free Optimization" ...

Overview

Ensemble Kalman Inversion

Electrical Impedance Tomography (EIT) 1. Chada et al (5)

A biased tour of geophysical inversion - AGU 2020 Gutenberg Lecture - A biased tour of geophysical inversion - AGU 2020 Gutenberg Lecture by InLab 3,233 views 4 years ago 52 minutes - Prof. Malcolm Sambridge, FAA The Australian National University For slides, comments and more see: ...

Intro

My tour guides

A Biased Tour of Geophysical Inversion

Inverse problems: all shapes and sizes

A visit to seismic imaging

A visit to Compressive Sensing

A visit to: Overcomplete tomography

An example of Overcomplete X-ray tomography

A visit to Machine Learning

An adversarial inversion framework

Surrogate Bayesian sampling

A visit to Optimal Transport

Waveform misfits Least Squares and OT

Optimal transport maps one PDF onto another

Optimal transport in seismic waveform inversion

OT solutions in 1D

How to convert a waveform into a PDF?

Marginal Wasserstein in 2D

Computation of the Wasserstein distance between seismic fingerprints

A toy problem: Double Ricker wavelet fitting

Least squares misfit and Wasserstein distance between a pair of double Ricker wavelets

L2 waveform misfit surface

Calculating derivatives of Wasserstein distance

Minimizing the Wasserstein distance w

Biased conclusions

My life tour guides

Transient Unsaturated Flow and Transport using GSPy and HYDRUS 1D - Transient Unsaturated Flow and Transport using GSPy and HYDRUS 1D by GoldSim Technology Group 1,985 views 3 years ago 37 minutes - This webinar provides an example of how to model transient unsaturated flow and transport in a simple soil column using ...

Introduction

Background Concepts

Overview

Applications

GSPy Limitations

Generic 1D Transport Column

Transient Flow and Transport

Main Challenge

Method

Components

Example Model

GoldSim Model

Validation Question

Benefits and Limitations

Limitations

Solve 1D Advection-Diffusion Equation Using Crank Nicolson Finite Difference Method - Solve 1D Advection-Diffusion Equation Using Crank Nicolson Finite Difference Method by Sam R 10,859 views 6 years ago 21 minutes - Solve 1D Advection-Diffusion Equation Using Crank Nicolson Finite Difference Method.

Introduction

Objectives

Problem Statement

Crank Nicholson Method

Equation in Final Form

Crank Nicolson Method

Implicit Method

Boundary Conditions

Interior Nodes

Matrix Form

Initial Conditions

Thomas Algorithm

Code

Summary

ERT - Session 4: Pseudo-section vs. Inverted Model - ERT - Session 4: Pseudo-section vs. Inverted Model by One Geoscientist 5,786 views 4 years ago 13 minutes, 56 seconds - Electrical Resistivity Tomography (ERT) - from Zero to Hero Session 4: Pseudo-section vs. Inverted Model - Definition of resistivity ...

Table of Contents

Last session...

What is Pseudo-section?

Pseudo-section vs. Inverted Model After a process called inversion (inverse modeling), the true resistivity values are estimated based on field

ERT - Session 5: Forward Modeling of Resistivity Data with Res2dmod software - ERT - Session 5: Forward Modeling of Resistivity Data with Res2dmod software by One Geoscientist 8,523 views 4 years ago 34 minutes - Electrical Resistivity Tomography (ERT) - from Zero to Hero Session 5: Forward vs. **Inverse**, Modeling together with 2D Forward ...

Table of Contents

Forward Modeling

Non-uniqueness in Geophysics

Forward vs. Inverse Modeling

Res2dmod Software

EAGE Student E-Lecture: Frequency Decomposition of Seismic Data by Gaynor Paton - EAGE Student E-Lecture: Frequency Decomposition of Seismic Data by Gaynor Paton by EAGE Channel 24,779 views 9 years ago 19 minutes - EAGE Student E-Lecture: Frequency Decomposition of Seismic Data by Gaynor Paton Frequency Decomposition and RGB ...

Introduction

Geological Reconnaissance

Frequency to Estimate Thickness

Reservoir compartmentalization

Summary

Project VI: Two-Dimensional Diffusion Equation | Lecture 74 | Numerical Methods for Engineers - Project VI: Two-Dimensional Diffusion Equation | Lecture 74 | Numerical Methods for Engineers by Jeffrey Chasnov 9,450 views 4 years ago 12 minutes, 4 seconds - A discussion about a MATLAB code to solve the two-dimensional diffusion equation using the Crank-Nicolson method. Join me on ...

Differential Equation

Solving the Matrix Equation

Lu Decomposition

Graphics

Tutorial: Geophysical modeling \u0026amp; inversion with pyGIMLi - Tutorial: Geophysical modeling \u0026amp; inversion with pyGIMLi by Software Underground 14,793 views Streamed 3 years ago 1 hour, 53 minutes - Florian Wagner, Carsten R\u00fccker, Thomas G\u00fcnther, Andrea Balza Tutorial Info: - <https://github.com/gimli-org/transform2021> ...

Introduction

Main features, conda installer, API doc

2D meshtools demonstration

Equation level: 2D heat equation

Crosshole traveltimes forward modeling

Method Manager: Traveltimes inversion

Inverting electrical resistivity field data

Inversion with own forward operator

Homepage with examples, papers, contribution guide

electrochemical impedance spectroscopy graph, charge transfer and solution resistance values - electrochemical impedance spectroscopy graph, charge transfer and solution resistance values by Scholarships and research WITH ZDG 2,897 views 1 year ago 9 minutes, 46 seconds - electrochemical impedance spectroscopy(EIS) graphs in origin lab and values of charge transfer and solution resistance.

Inverse Optimization: Applications, Models, and Algorithms, Ian Yihang Zhu - Inverse Optimization: Applications, Models, and Algorithms, Ian Yihang Zhu by GERAD Recherche 1,814 views 2 years ago 55 minutes - S\u00e9minaire GERAD \u0026amp; CIRRELT **Inverse**, Optimization: **Applications**, Models, and Algorithms by Ian Yihang Zhu - University of ...

Introduction

Outline

Applications

Linear Inverse Optimization

Example

Downsides

True Observations

Algorithm

Results

Loss Functions

Conclusion

SR3 - Solving geophysical inverse problems on GPUs with PyLops+cupy - Matteo, Lukas Mosser, David. - SR3 - Solving geophysical inverse problems on GPUs with PyLops+cupy - Matteo, Lukas Mosser, David. by Software Underground 1,333 views Streamed 4 years ago 1 hour, 19 minutes - Today's Session was hosted

by Matteo Ravasi. With an intro to PyLops, its CuPy acceleration from Matteo and with presentations ...

Inverse Problems

What should the result look like?

How do we do it? - bear with me

Local Dip Vectors of Seismic Image

Reduced-Order Modeling and Inversion for Large-Scale Problems of Geophysical Exploration - Reduced-

Order Modeling and Inversion for Large-Scale Problems of Geophysical Exploration by Society for

Industrial and Applied Mathematics (SIAM) 448 views 2 years ago 1 hour, 4 minutes - Date and Time:

Thursday, May 12, 2022, 12:00pm Eastern time zone Speaker: Mikhail Zaslavsky, Schlumberger Doll

Research ...

Introduction

Announcements

Contact information

Presentation

Formulation

Examples

Multiinput

Challenges

Goals

General Overview

Model Problem

Model Driven Reduce

Properties

Data Driven

Transfer Function

Summary

Takeaway

Model PD

Acoustic Imaging

Data to Burn

Data assimilation in hydrological sciences (Part I) - Data assimilation in hydrological sciences (Part I) by

ICTP Earth System Physics 265 views 3 years ago 41 minutes - Joint ICTP-IUGG Workshop on Data

Assimilation and **Inverse Problems**, in **Geophysical**, Sciences | (smr 3607) Speaker: Fabio ...

Introduction

Outline

Hydrology

Applications

Convergence

Data simulation

Remote sensing

Holistic hydrologic model

State estimation

Kalman filter example

Kalman filter diagnostic

Soil moisture

Questions

Case study

1.0 Introduction to inverse problems - 1.0 Introduction to inverse problems by Involcan Iter 5,256 views 5

years ago 22 minutes - You cannot approximate them by using linear **inverse problems**, well what is the result of **inverse problems**, the most important ...

Data-Driven Inverse Modeling with Incomplete Observations by Kailai Xu - Data-Driven Inverse Modeling

with Incomplete Observations by Kailai Xu by MLPS - Combining AI and ML with Physics Sciences 1,538

views 5 years ago 32 minutes - Kailai Xu (Stanford), Data-Driven **Inverse**, Modeling with Incomplete

Observations Deep neural networks (DNN) have been used to ...

Introduction

Gradient Based Optimization

Automatic Propagation

Applications

Incomplete Observation

Inverse Modeling

Results

Future Work

Mathematics Colloquium: Deep learning, inference and inverse problems | Maarten V. de Hoop -

Mathematics Colloquium: Deep learning, inference and inverse problems | Maarten V. de Hoop by NTUspms

351 views 3 years ago 1 hour, 22 minutes - Online Mathematics colloquium by Professor Maarten V. de

Hoop (Rice University), held on 15 July 2021. Abstract: We present ...

setting

implicit neural representation

operator recurrent neural networks (ORNN)

prior work

sparse representations of trained matrices

set of weights

fundamental constant

truncated network

inverse problems

approximation properties

convex regularization

loss functions, preparation

random variables

expected loss and regularization

Bayes estimator

empirical loss

optimal weights

generalization

globally injective Rel.U networks

feed-forward networks

injective flows

injective generators - Trumpets

evaluation of likelihood

split training

posterior modeling and uncertainty quantification

limited view CT: MAP estimate, samples from posterior distribution

outlook

From Capture to Simulation, Connecting Forward and Inverse Problems in Fluids - SIGGRAPH 2014 Paper -

From Capture to Simulation, Connecting Forward and Inverse Problems in Fluids - SIGGRAPH 2014 Paper

by Nils Thuerey 2,362 views 10 years ago 3 minutes, 23 seconds - Authors: J. Gregson, N. Thuerey, I. Ihrke,

W. Heidrich The video for our SIGGRAPH 2014 submission, details can be found here: ...

Comparison with tomography data Passive advection with reconstructed velocities

Horn-Schunck with divergence penalty

"Smoke" data velocities for 40 frames, then dynamic simulation with changed domain.

Guided simulation

Input (tomography data)

Passive advection with reconstructed velocities, additional wavelet turbulence

EAGE E-Lecture: Resolving Near-Surface Velocity Anomalies in Marine Data by Ian F. Jones - EAGE E-

Lecture: Resolving Near-Surface Velocity Anomalies in Marine Data by Ian F. Jones by EAGE Channel

5,789 views 10 years ago 31 minutes - Unresolved velocity anomalies in the near surface degrade deeper

imaging. As a consequence, great care needs to be taken to ...

Introduction

Service Modeling

Methods

Channels

Visible Channels

GeoBody

Subsurface Illumination

Moving Out

Moving Out Example

Waveform Inversion

amber's inverse theory project - amber's inverse theory project by AmbirdFlies 12 views 4 months ago 15 minutes - 24Wunsch, **Discrete inverse**, and **state estimation problems**,: with **geophysical fluid applications**,, 2006.

Solving larger seismic inverse problems with smarter methods (Part II) - Solving larger seismic inverse problems with smarter methods (Part II) by ICTP Earth System Physics 150 views 3 years ago 41 minutes - Joint ICTP-IUGG Workshop on Data Assimilation and **Inverse Problems**, in **Geophysical**, Sciences | (smr 3607) Speaker: Andreas ...

Basic Concept

Extension to 3D

Computing sensitivity kernels

Discrete adjoint method

2D Full-Waveform Inversion

Preliminary Results

Comparison of Computational Cost

Some new trends and old sessions in geophysical inversion (Part I) - Some new trends and old sessions in geophysical inversion (Part I) by ICTP Earth System Physics 907 views 3 years ago 38 minutes - Joint ICTP-IUGG Workshop on Data Assimilation and **Inverse Problems**, in **Geophysical**, Sciences | (smr 3607) Speaker: Malcolm ...

Intro

Review chapter

Data, data everywhere

Forward and Inverse problems

Discretizing a model.

Classes of inverse problem

Two common approaches

Discrete Linear inversion

Discrete Nonlinear inversion

Under-determined problems

Sparsity Looking for sparse solutions to linear and nonlinear parameter estimation

Why does sparsity maximisation work?

Compressive sensing in a nutshell

Compressive sensing example

Least squares reconstruction p

Least squares reconstruction ($p = 2$)

Compressed sensing reconstruction ($p = 1$)

The age of big data

Sparsity based image reconstruction

Overcomplete tomography example

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