Volume 27, Number 02 IPNet Digest February 28, 2020 Today's Editor: Patricia (Patti) K. Lamm, Michigan State University Today's Topics: PhD Course: Computational Uncertainty Quantification for Inverse Problems Symposium: Chemnitz Symposium on Inverse Problems, at Annual DMV-Meeting Registration Open: Int'l Conference on Inverse Problems in Engineering Symposium: The Mathematics of Machine Learning Postdoc: Deep Learning Based Segmentation, CT-Reconstruction, at KTH Stockholm Junior Professorship: Applied Mathematics in Natural Sciences, at Göttingen Postdoc: Data Science with Large and Complex Data, at UC Davis Statistics Special issue: Special Inverse Problems Issue (Optimization and Engineering) hIPPYlib: A Python-based Inverse Problems Solver Library Table of Contents: Inverse Problems Table of Contents: Journal of Inverse and Ill-posed Problems Submissions for IPNet Digest: Mail to ipnet-digest@math.msu.edu

Information about IPNet:
 http://ipnet.math.msu.edu

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From: Yiqiu Dong <yido@dtu.dk> Subject: PhD course on "Computational Uncertainty Quantification for Inverse Problems" Date: Friday, January 31, 2020

We would like to draw your attention to our forthcoming PhD course on "Computational Uncertainty Quantification for Inverse Problems".

The course will be held from 11 May to 15 May 2020 at the Technical University of Denmark. This course is aimed at PhD students and researchers in applied mathematics and physics who want to understand and use UQ in connection with inverse problems such as image deblurring, computed tomography, and inverse scattering.

The course consists of lectures and exercises using MATLAB. The topics are: a review of computational inverse problems, Bayesian methods and UQ for inverse problems, prior modeling with Markov random fields, and recently developed MCMC methods for UQ in inverse problems.

The course ends with a mini-project done by the course participants. The course is given by Professor Johnathan M. Bardsley from the University of Montana, and it uses the book: J. M. Bardsley, Computational Methods and Uncertainty Quantification for Inverse Problems, SIAM, 2018. Further details can be found from the website: https://kurser.dtu.dk/course/02923.

Sign up for the course by sending an email to Yiqiu Dong: yido@dtu.dk.

Submitted by: Yiqiu Dong Associate professor

Department of Applied Mathematics and Computer Science Technical University of Denmark

From: Jan-F. Pietschmann <jfpietschmann@math.tu-chemnitz.de> Subject: Chemnitz Inverse Problems Symposium 2020 @ DMV Date: February 10, 2020

Dear collegues,

we are happy to announce this year's Chemnitz Symposium on Inverse Problems which will be part of the annual DMV-Meeting (German mathematical society) taking place in Chemnitz from

\*September 14 to 17, 2020.\*

It will be organized by Barbara Kaltenbacher, Andrew Stuart and myself and we cordially invite you to join us.

All relevant information are summarized here:

https://urldefense.com/v3/\_\_https://www.chemnitz-am.de/ipsym2020/\_\_;!!HXCxUKc! hwiV\_wXgp06resSKrGwjJ3TN0GwzubML02hda9Jt1hur9Zs\_9ba6fPkUQUeo5hS61HtIGAo\$

Note that the registration works directly via the DMV.

We would be happy to see many of you in Chemnitz this fall.

Best regards, Barbara, Andrew and Jan

Submitted by: Prof. Dr. Jan-Frederik Pietschmann Faculty of Mathematics TU Chemnitz, 09107 Chemnitz, Germany email jfpietschmann@math.tu-chemnitz.de phone +49 371 531 36901

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From: Convegno ICIPE 2020 <icipe20@strutture.univaq.it> Subject: I: 10th International Conference on Inverse Problems in Engineering: ICIPE 20. Registration and final paper sumission website open Date: Friday, February 28, 2020

Dear Authors,

The registration for the "10th International Conference on Inverse Problems in Engineering: ICIPE 20" is now open and available on the web site.

The authors that have received the acceptance of their full-length papers can submit the final paper and an extended version of the related abstract via the "final paper

submission website."

The "online paper submission" system will be kept open for those authors that have still to submit the draft version of their ICIPE 20 papers. Note the firm "no paper/no podium" policy of the conference.

You may find detailed information on the Web site: http://icipe20.univaq.it.

In addition, as regards the diffusion of the COVID-19 virus, it is of great concern to state that there are no problems in the region where the conference will be held. In fact, schools, public and private offices, universities, companies, and so on, are normally open. The risk zones called "red zones" are located only in the North-part of Italy, in the regions of Milan and Venice, that are 400 miles far from the conference venue and are currently guarded by the police.

Best regards,

The ICIPE 20 Organizing Committee

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From: Matthias Ehrhardt <me549@bath.ac.uk> Subject: The Mathematics of Machine Learning, August 2020, Bath, UK Date: Friday, February 7, 2020

LMS-Bath Symposium on The Mathematics of Machine Learning University of Bath, UK 3rd-7th August 2020 https://mathml2020.github.io/

## Background

Machine learning (ML) is currently undergoing a massive expansion, due to the unprecedented availability of large amounts of data and computational power. The last decade has seen tremendous improvements in ML methods and achievements in many application areas including (bio-) medical sciences, computer vision and finance to name but a few.

Remarkably, while ML relies on mathematical models and tools, many ML algorithms do not have a rigorous mathematical foundation. One reason for this is that ML has been historically developed as a subfield of computer science rather than mathematics. Fundamental analysis questions are open, such as convergence and convergence rates, or the topology and geometry with which data should be studied.

It is essential that the mathematical community contributes to ML and provides a solid underpinning of ML methods. This Symposium will advocate the connection between ML and many mathematical disciplines, such as numerical analysis, inverse problems, optimisation, statistics, optimal transport, dynamical systems and partial differential equations, in order to shed light into the mysterious mathematical pathways of ML.

## Call for Posters

In addition to the invited speakers, there is an opportunity for early career researchers to attend the Symposium and contribute a poster presentation. To apply,

please submit a 1 page abstract here by 13th March 2020. Please note that places are limited, and notifications of acceptance will be sent out by 10th April 2020.

Please note that participants presenting a poster are responsible for their own accommodation, subsistence and travel costs. However, there is no registration fee for participation.

The Organising Committee: Philip Aston, Matthias Ehrhardt, Catherine Higham, Clarice Poon

Submitted by: Matthias J Ehrhardt, PhD, Prize Fellow Office: 6 West, 1.08, Tel: 0044 1225 38 6194 Institute for Mathematical Innovation, University of Bath, UK https://mehrhardt.github.io

From: Ozan Öktem <ozan@kth.se> Subject: Postdoctoral fellowship on deep learning based segmentation and CT-reconstruction Date: February 18, 2020

Job announcement

2-year postdoctoral fellowship on deep learning based segmentation and CT-reconstruction

Deadline: 9 March 2020
Link:
https://urldefense.com/v3/\_\_https://kth.varbi.com/en/what:job/jobID:311753/\_\_;!!HXCxUKc!
kzEPGEU2c6tn-o8Wzj1mD9F1ye0S5G3eHaHAt\_WSNNpcJs16sOg0KbLHLuZQpfqZ\$

The position at the Department of Mathematics, KTH in Stockholm concerns research into usage of develop deep learning for image joint CT-reconstruction and segmentation of forest logs. It is part of a larger joint project with the University of Oulu, Lappeenranta-Lahti University of Technology, and Finnos Oy on image guided optimization of the sawline processing of logs. For further information and instructions for applying, see link above.

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From: "Hohage, Thorsten" <hohage@math.uni-goettingen.de> Subject: junior professorship "Applied mathematics in the natural sciences" at Göttingen Date: Monday, February 24, 2020

The Institute of Numerical and Applied Mathematics at the University of Göttingen invites applications for a

Junior Professor Position (W1) on Applied Mathematics in the Natural Sciences

to begin at the earliest possible date. We seek to appoint a researcher with an excellent Ph.D. thesis and a core expertise in applied mathematics with relations to model-based data analysis in the natural sciences. The successful candidate is expected to have experience in interdisciplinary research and to support a planned collaborative

research center with experimental scientists. Connections to at least one of the research directions already represented at the institute are desired. Teaching obligations comprise courses in the Bachelor, Master, and PhD programs of mathematics as well as the Bachelor program "Mathematical Data Science". The university puts emphasis on research-oriented teaching.

Application deadline is March 22, 2020.

The full job advertisement with more important information can be found at http://www.uni-goettingen.de/de/305402.html?cid=14883

For further information, please contact Prof. Dr. Thorsten Hohage, hohage@math.uni-goettingen.de

From: Naoki Saito <saito@math.ucdavis.edu> Subject: UCD4IDS Postdoc in Statistics Date: Monday, February 24, 2020

University of California, Davis Department of Statistics

Postdoctoral Position in Data Science at UC Davis

The Department of Statistics at the University of California, Davis, and the UC Davis TETRAPODS Institute of Data Science (UCD4IDS) funded by the NSF HDR-TRIPODS grant, are soliciting applications for a UCD4IDS postdoctoral employee position starting July 1, 2020.

The Department and the Institute seek applicants who demonstrate promise and the capability of developing cutting edge computational, mathematical, and/or statistical methodology pertaining to modern areas of data science that involve large and complex data, as well as effective teaching skills. In particular, those candidates whose research interests are in the following three broad themes of the Institute are strongly encouraged to apply:

 Fundamentals of machine learning directed toward biological and medical applications;
 Optimization theory and algorithms for machine learning including numerical solvers for large-scale nontrivial learning problems; and 3) High-dimensional data analysis on graphs and networks.

Applicants are required to have completed their Ph.D. by the time of their appointment, but no earlier than July 1, 2017. The appointment may include teaching up to three courses per academic year, which will be negotiable. The appointment will be for up to two years, renewable after the first year upon demonstration of satisfactory performance in research and teaching (if applicable).

The position will remain open until filled, but to assure full consideration please submit a cover letter, Statement of Research, Statement of Teaching, Statement of Contribution to Diversity, curriculum vitae, 2-4 letters of reference, and transcripts (if PhD obtained during 2017 or later) by March 13, 2020. Applications are submitted online through UC Recruit at https://recruit.ucdavis.edu/analyst/recruitments/JPF03387/. The University of California is an Equal Opportunity/Affirmative Action Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability, age or protected veteran status.

Department of Statistics, University of California, Davis
(https://statistics.ucdavis.edu/)

From: LA TORRE Davide <davide.latorre@skema.edu> Subject: Special Issue in Optimization and Engineering - Springer Date: Sunday, January 26, 2020

Special issue on Optimization Methods in Inverse Problems and Application to Science and Engineering

Guest Editors: H. Kunze (University of Guelph, Canada), D. La Torre (SKEMA Business School, France), M. Ruiz-Galan (University of Granada, Spain)

Deadline for submissions: July 31, 2020 1st round of review - comments to authors: September 30, 2020 Revision deadline: November 30, 2020 Submission of final version: December 31, 2020

This special issue aims at bringing together articles that discuss recent advances of optimization methods and algorithms in inverse problems and application to science and engineering. A typical inverse problem seeks to find a mathematical model that admits given observational data as an approximate solution. This sort of question is of great interest in many application areas, including biomedical engineering and imaging, remote sensing and seismic imaging, astronomy, oceanography, atmospheric sciences and meteorology, chemical engineering and material sciences, computer vision and image processing, ecology, economics, environmental systems, physical systems. Very often an inverse problem appears in the form of a parameter estimation problem, it can be formulated as an optimization model, and then solved using different optimization algorithms and techniques. All papers included in this special issue will consider aspects of numerical analysis, mathematical modeling, and computational methods. Potential topics include but are not limited to the following:

Inverse Problems Algorithms Inverse Problems for Ordinary and Differential Equations Inverse Problems using Nonsmooth Optimization Inverse Problems using Multicriteria Optimization Fractal-based Inverse Problems Shape Optimization Inverse Optimization Inverse Problems in Image Analysis Regularization Techniques

https://www.opte-journal.com/index.php?page=sis

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From: Umberto Villa uvilla@wustl.edu [via nadigest] Date: February 04, 2020 Subject: Introducing hIPPYlib, a python-based inverse problems solver library

We are pleased to announce the availability of hIPPYlib, an extensible software framework for solving large-scale deterministic and Bayesian inverse problems governed by partial differential equations (PDEs) with (possibly) infinite-dimensional parameter fields. The development of this project is being supported by the National Science Foundation.

The current version of hIPPYlib is 3.0 and can be downloaded from: https://urldefense.com/v3/\_\_https://hippylib.github.io\_\_;!!HXCxUKc! nkU7nExnZZTsFrzzxEEo5rdwARAucxawAPtDLLnWF9bNvfNbevHn7c5p9ZSNlzEq\$

This computational tool implements state-of-the-art scalable adjoint-based algorithms for PDE-based deterministic and Bayesian inverse problems. It builds on FEniCS for the discretization of the PDE and on PETSc for scalable and efficient linear algebra operations and solvers.

For more details, please check out the manuscript: https://urldefense.com/v3/\_\_http://arxiv.org/abs/1909.03948\_\_;!!HXCxUKc! nkU7nExnZZTsFrzzxEEo5rdwARAucxawAPtDLLnWF9bNvfNbevHn7c5p9UrdrroL\$

For additional resources and tutorials please check out the teaching material from the 2018 Gene Golub SIAM Summer School on ``Inverse Problems: Systematic Integration of Data with Models under Uncertainty" available at https://urldefense.com/v3/\_http://g2s3.com\_;!!HXCxUKc! nkU7nExnZZTsFrzzxEEo5rdwARAucxawAPtDLLnWF9bNvfNbevHn7c5p9bnDlb85\$ .

Umberto Villa, Noemi Petra and Omar Ghattas

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From: "noreply@iopscience.org" <noreply@iopscience.org>
Subject: Contents, Inverse Problems
Date: Wednesday, January 29, 2020

Inverse Problems

December 2019 Volume 35, Number 12 Table of Contents

Special Issue Papers:

Direct and inverse electromagnetic scattering problems for bi-anisotropic media Dinh-Liem Nguyen

Fast linear inversion for highly overdetermined inverse scattering problems Vadim A Markel, Howard Levinson and John C Schotland

Quasi-boundary value methods for regularizing the backward parabolic equation under the optimal control framework Jun Liu and Mingqing Xiao Finite element approximation of source term identification with TV-regularization Michael Hinze and Tran Nhan Tam Quyen

A common lines approach for ab initio modeling of cyclically symmetric molecules Gabi Pragier and Yoel Shkolnisky

Factorization method versus migration imaging in a waveguide Liliana Borcea and Shixu Meng

Inverse scattering for the Laplace operator with boundary conditions on Lipschitz surfaces Andrea Mantile and Andrea Posilicano

A convex-nonconvex variational method for the additive decomposition of functions on surfaces Martin Huska, Alessandro Lanza, Serena Morigi and Ivan Selesnick

Papers:

Carleman estimate and an inverse source problem for the Kelvin-Voigt model for viscoelasticity O Yu Imanuvilov and M Yamamoto

Uniqueness of determining the variable fractional order in variable-order time-fractional diffusion equations Xiangcheng Zheng, Jin Cheng and Hong Wang

Imaging point sources in heterogeneous environments Kui Ren and Yimin Zhong

The discrete Fourier transform for golden angle linogram sampling Elias S Helou, Marcelo V W Zibetti, Leon Axel, Kai Tobias Block, Ravinder R Regatte and Gabor T Herman

An accelerated sequential subspace optimization method based on homotopy perturbation iteration for nonlinear ill-posed problems Shanshan Tong, Bo Han, Haie Long and Ruixue Gu

Stability results for backward time-fractional parabolic equations Dinh Nho Hào, Jijun Liu, Nguyen Van Duc and Nguyen Van Thang

Orthogonal function series formulae for inversion of the conical Radon transform with a fixed central axis Sunghwan Moon

Reconstruction from convolution random sampling in local shift invariant spaces Yaxu Li, Jinming Wen and Jun Xian

\alpha\ell\_1 - \beta\ell\_2 regularization for sparse recovery
Liang Ding and Weimin Han

Unique determination of inverse electromagnetic scattering by a two-layered cavity Fenglong Qu and Jiaqing Yang

Fast subspace optimization method for nonlinear inverse problems in Banach spaces with uniformly convex penalty terms Ruixue Gu, Bo Han and Yong Chen

On a novel inverse scattering scheme using resonant modes with enhanced imaging resolution Hongyu Liu, Xiaodong Liu, Xianchao Wang and Yuliang Wang

Iterative deconvolution for kernels with strictly positive Fourier transforms R S Anderssen, F R de Hoog and R J Loy

Corrigendum

Corrigendum to 'Generalized linear sampling method for the inverse elastic scattering of fractures in finite bodies' (2019 Inverse Problems 35 104002) Thi-Phong Nguyen and Bojan B Guzina

https://iopscience.iop.org/issue/0266-5611/35/12

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Inverse Problems	March 2020	Volume 36, Number 3	5
		Table of Contents	

Special Issue: Special Issue in Memory of Professor Armin Lechleiter, 1982–2018 Fioralba Cakoni, Houssem Haddar and Andreas Kirsch

Special Issue Papers:

Analysis of shape optimization problems for unsteady fluid-structure interaction Johannes Haubner, Michael Ulbrich and Stefan Ulbrich

A Nash game based variational model for joint image intensity correction and registration to deal with varying illumination Anis Theljani and Ke Chen

Geometric numerical integration of the assignment flow Alexander Zeilmann, Fabrizio Savarino, Stefania Petra and Christoph Schnörr

Differential imaging of local perturbations in anisotropic periodic media Thi-Phong Nguyen

Deep unfolding of a proximal interior point method for image restoration C Bertocchi, E Chouzenoux, M-C Corbineau, J-C Pesquet and M Prato

Papers:

Explicit power laws in analytic continuation problems via reproducing kernel Hilbert

spaces

Yury Grabovsky and Narek Hovsepyan

Solving inverse bioheat problems of skin tumour identification by dynamic thermography J Iljaž, L C Wrobel, T Gomboc, M Hriberšek and J Marn

Electro-magnetoencephalography for a spherical multiple-shell model: novel integral operators with singular-value decompositions S Leweke, V Michel and A S Fokas

Sparse reconstructions of acoustic source for inverse scattering problems in measure space Xueshuang Xiang and Hongpeng Sun

The fixed angle scattering problem and wave equation inverse problems with two measurements Rakesh and Mikko Salo

Identification of the degradation coefficient for an anomalous diffusion process in hydrology Guang-Hui Zheng and Ming-Hui Ding

Orthogonal function series formulas for inversion of the spherical Radon transform Sunghwan Moon

Uniqueness of solution of an inverse source problem for ultrahyperbolic equations Fikret Gölgeleyen and Masahiro Yamamoto

Inverse problems with partial data for elliptic operators on unbounded Lipschitz domains

Jussi Behrndt and Jonathan Rohleder

Imaging with highly incomplete and corrupted data Miguel Moscoso, Alexei Novikov, George Papanicolaou and Chrysoula Tsogka

Applications of kinetic tools to inverse transport problems Qin Li and Weiran Sun

Linearly involved generalized Moreau enhanced models and their proximal splitting algorithm under overall convexity condition Jiro Abe, Masao Yamagishi and Isao Yamada

The ML-EM algorithm in continuum: sparse measure solutions Camille Pouchol and Olivier Verdier

An inverse acoustic-elastic interaction problem with phased or phaseless far-field data

Heping Dong, Jun Lai and Peijun Li

Greedy approximate projection for magnetic resonance fingerprinting with partial volumes

Roberto Duarte, Audrey Repetti, Pedro A Gómez, Mike Davies and Yves Wiaux

A domain decomposition preconditioning for an inverse volume scattering problem Carlos Borges and George Biros

Unique reconstruction of the potential for the interior transmission eigenvalue problem for spherically stratified media Zhaoying Wei and Guangsheng Wei

Nachman's reconstruction method for the Calderón problem with discontinuous conductivities George Lytle, Peter Perry and Samuli Siltanen

Fast binary CT using Fourier null space regularization (FNSR) G A Jones and P Huthwaite

A bilevel learning approach for optimal observation placement in variational data assimilation P Castro and J C De los Reyes

Analysis of a multilevel Markov chain Monte Carlo finite element method for Bayesian inversion of log-normal diffusions Viet Ha Hoang, Jia Hao Quek and Christoph Schwab

Erratum

Erratum for Mathematical models for magnetic particle imaging (2018 Inverse Problems 34 083001) Tobias Kluth

https://iopscience.iop.org/issue/0266-5611/36/3

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From: "noreply@degruyter.com" <noreply@degruyter.com>
Subject: Contents, 'Journal of Inverse and Ill-posed Problems'
Date: Wednesday, January 29, 2020

Journal of Inverse and Ill-posed Problems February 2020 Volume 28, Issue 1 Table of Contents

Modified Radon transform inversion using moments Choi, Hayoung / Ginting, Victor / Jafari, Farhad / Mnatsakanov, Robert

Inverse source problem for a distributed-order time fractional diffusion equation Cheng, Xiaoliang / Yuan, Lele / Liang, Kewei

Two closed novel formulas for the generalized inverse A T,S (2) of a complex matrix with given rank Sheng, Xingping

The problem of determining the one-dimensional kernel of viscoelasticity equation with a source of explosive type

Durdiev, Durdimurod Kalandarovich / Totieva, Zhanna Dmitrievna

Inverse problems for a class of linear Sobolev type equations with overdetermination on the kernel of operator at the derivative Fedorov, Vladimir Evgenyevich / Ivanova, Natalia Dmitrievna

Isospectral sets for transmission eigenvalue problem Yang, Chuan-Fu / Buterin, Sergey A.

Stability estimate for an inverse problem of the convection-diffusion equation Bellassoued, Mourad / Rassas, Imen

The enclosure method for the heat equation using time-reversal invariance for a wave equation Ikehata, Masaru

Joint inversion of compact operators Mead, Jodi L. / Ford, James F.

Inverse problem of breaking line identification by shape optimization Ghilli, Daria / Kunisch, Karl / Kovtunenko, Victor A.

The backward problem of parabolic equations with the measurements on a discrete set Cheng, Jin / Ke, Yufei / Wei, Ting

Optimal convergence rates for inexact Newton regularization with CG as inner iteration Neubauer, Andreas

https://www.degruyter.com/view/j/jiip.2020.28.issue-1/issue-files/jiip.2020.28.issue-1.
xml
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