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Today's Editor: Patricia (Patti) K. Lamm, Michigan State University

Today's Topics:

Submissions for IPNet Digest:
    Mail to ipnet-digest@math.msu.edu

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

From: Omar Ghattas <omar@ices.utexas.edu>
Subject: Upcoming deadlines: 2018 SIAM Conference on Imaging Science (IS18), University of Bologna, Italy, June 5-8, 2018
Date: September 6, 2017

The 2018 SIAM Conference on Imaging Science (IS18) will be held at the University of Bologna in Bologna, Italy, June 5-8, 2018.

Please note the upcoming deadlines for submission of minisymposium proposals (October 1) and contributed lectures, minisymposium presentations, and posters (November 5). Further conference information can be found below and at https://www.siam-is18.dm.unibo.it.

2018 SIAM Conference on Imaging Science (IS18)
Location: University of Bologna, Bologna, Italy
Dates: June 5-8, 2018
Website: https://www.siam-is18.dm.unibo.it

Sponsors:
The conference is sponsored by SIAM Activity Group on Imaging Science (SIAG/IS) and the Bologna Committee for IS Conference 2018 (BCIS18). It is being held in cooperation with the IEEE Signal Processing

Society (IEEE) and Gesellschaft für Angewandte Mathematik und Mechanik e.V. (GAMM).

Conference Co-Chairs:
Omar Ghattas (The University of Texas at Austin)
Fiorella Sgallari (Dept. Mathematics, University of Bologna)

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Ronny Ramlau (Kepler University Linz and Johann Radon Institute)
Carola-Bibiane Schönlieb (University of Cambridge)
Gabriele Steidl (Technische Universität Kaiserslautern)
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Damiana Lazzaro (Dept. Mathematics, University of Bologna)
Elena Loli Piccolomini (Dept. Mathematics, University of Bologna)
Roberto Mecca (University of Bologna and University of Cambridge)
Serena Morigi (Dept. Mathematics, University of Bologna)
Michele Piana (Dept. Mathematics, University of Genoa)
Giulia Scalet (Dept. Civil Engineering and Architecture, University of Pavia)
Federica Sciacchitano (Dept. Mathematics, University of Genoa)
Valeria Simoncini (Dept. Mathematics, University of Bologna)
Giulia Spaletta (Dept. Mathematics, University of Bologna)
Fabiana Zama (Dept. Mathematics, University of Bologna)

During the conference the Organizing Committee will give two special awards to promote and rewards new ideas:

- IS18 best poster award: 2000 Euros
- IS18 best challenging application award (among posters and

minisymposia): 1000 Euros

Important Dates and Deadlines:
- October 01, 2017 - Minisymposium proposals
- November 05, 2017 - Contributed Lecture and Minisymposium Presentation Abstracts
- November 05, 2017 - Poster Abstracts
- April 04, 2018 - Early registration deadline

Submission information: https://www.siam-is18.dm.unibo.it/submissions
Additional information: email siam-is2018@unibo.it

From: Ledger P.D. <p.d.ledger@swansea.ac.uk>
Subject: PhD Studentship in the Improved Detection of Security Threats at Swansea University (UK)
Date: September 4, 2017

Applications are invited for a UK/EU PhD studentship in the Zienkiewicz Centre for Computational Engineering (ZCCE), College of Engineering, Swansea University. Swansea University is a UK top 30 institution for research excellence (Research Excellence Framework 2014), and has been named as Welsh University of the Year 2017 by The Times and Sunday Times Good University Guide.

A new 3-year project on improving metal detection for the identification of security threats is expected to begin in Autumn 2017 and this PhD studentship will form part of a team that will also include post-doctoral researchers and collaborators in the Department of Mathematics, University College London (UCL) and the Schools of Mathematics and Electrical and Electronic Engineering, the University of Manchester (UoM). The successful candidate's first supervisor will be Dr P.D. Ledger in ZCCE who is also the principal investigator of the project

The aim of the PhD will be to improve the characterisation and location of hidden conducting security threats using scientific computing algorithms. The student will have access to the College of Engineering's new high performance computer cluster which has 73 nodes, each comprising 28 cores. It is expected that the student will work closely with the other team members and attend research meetings as well as presenting at conferences and workshops. The student will also write technical reports describing their research progress in form that can be submitted to peer reviewed academic journals.

Anticipated enrollment: January 2018.

Eligibility: The studentship is restricted to EU/UK applicants.

Qualifications required: A masters degree (MEng, MMath, MPhys, MSc or MSci) in either Engineering, Mathematics or Physics. They should have achieved either 1st class or 2.1 undergraduate degree and a distinction at postgraduate level (if appropriate).

Experience/Skills required: Expertise in numerical algorithms for the solution of partial differential equations (e.g. Finite elements, boundary elements) and be proficient in programming in one or more of the following MATLAB, Python, Fortran, C/C++. Knowledge and experience of (computational) electromagnetics is also desirable. The ideal candidate should also be an effective team worker and enthusiastic about working closely with end users and industry.

The 3-year PhD studentship is expected to provide an annual stipend of £14,553 and cover tuition fees.

For further details and to apply please see

http://www.swansea.ac.uk/postgraduate/scholarships/research/computational-engineering-phd-improving-metal-detection.php

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From: Litman Amelie <amelie.litman@fresnel.fr>
Subject: Post-doc offer in Computer Science applied to biomedical imaging, at Institut Fresnel (Marseille)
Date: September 7, 2017

Post-doc offer in Computer Science applied to biomedical imaging at Institut Fresnel (Marseille)

Background
The successful applicant will join the collaborative project L-iOS (ANR PRCE 2016) aiming at developing a portable and highly accurate (spatially and spectrally) light sensor array for medical applications. He/she will join DiMABio group at Institut Fresnel and will develop and optimize a Monte Carlo simulator to model light propagation through biological tissues in the visible to mid-infrared (500-1500 nm). In this wavelength range, tissues are modeled as highly absorbing and scattering media. The light propagation phenomenon can be described by the Radiative Transfert Equation. One of the most versatile ways of solving this integro-differential equation is by Monte Carlo simulations. This forward model will be introduced in an inverse problem resolution loop in order to reconstruct the 3D maps of the parameters of interest, such as absorption or reduced scattering coefficients, and, in fine, concentrations of the biomarkers of interest (oxy- and deoxy-hemoglobin, glucose, fat…). The consortium comprises researchers and physicians from four different institutions in France: Toulouse Hospital, Laser Physics Laboratory (Paris), CEA-LETI (Grenoble) and Institut Fresnel (Marseille).

Description of the position
The applicant can base his/her developments on previous research work conducted at DiMABio group. A general Monte Carlo simulation code that takes into account polarization has been developed in Fortran [1]. Reciprocity relations appearing in the formulation of the inverse problem and strategies to improve the computation efficiency have been implemented [2].

In this context, the research program of the applicant could be:
  - To apply efficient GPU-based, CPU or hybrid CPU-GPU parallelization processes to speed up the forward model resolution;
  - To test different strategies of resolution of the inverse problem at a single wavelength, implement them in realistic situations and validate them with experimental data;
  - To propose a reconstruction scheme for spectrally resolved measurements.
  - To propose innovative general solutions within this project that could be used in other diffuse optics physical problems (Diffuse Optical Tomography, PhotoAcoustic Tomography, Polarization gating imaging).
  - To couple different forward model resolution techniques (mesh-based Monte Carlo), always with the objective to reduce computation complexity.

[1] https://www.cbica.upenn.edu/vmarkel/CODES/MC.html
[2] Tricoli et al. “Reciprocity relation for the vector radiative transport equation and its application to diffuse optical tomography with polarized light”, Optics Lett. 42(2), 2017.
[3] Macdonald, et al., “Numerical investigation of polarization filtering for direct optical imaging within scattering media”, JOSAA, (2017).

Qualifications
The applicant should have a strong background in Applied Mathematics and Computer Science. Expertise in physics/optics would be a plus but is not a requirement. He/she will join a group composed of theoretical and instrumental physicists, and will have to interact with the other researchers and engineers of the consortium. Hence, he/she should be independent and present a strong motivation in working in a multidisciplinary environment.

Place : Marseille, Institut Fresnel
Duration : 12 months
Starting date : November 1st, 2017

Send CV + lettre of motivation to anabela.dasilva@fresnel.fr

From: Shuchin Aeron <shuchin@ece.tufts.edu>
Subject: Post Doctoral Position: Machine Learning for Cognitive Sciences
Date: September 7, 2017

Postdoctoral position: Tufts University

Applications are invited for a postdoctoral position in the Tufts Information and Networked Systems (TINS) lab in collaboration with the recently established Center for Applied Brain and Cognitive Sciences (CABCS) at Tufts University and the U.S. Army Natick Soldier Systems Center at Natick., MA This appointment would be for 12-18 months with an estimated start date of October-November 2017.

The primary project is entitled “Real time prediction of individual and team

performance metric from neurophysiological measurements and team interaction data". Under this project, the fellow will work with Tufts ECE faculty, Dr. Shuchin Aeron and Dr. Eric Miller, as well as CABCS scientists to develop supervised and semi-supervised machine learning algorithms that are capable of predicting cognitive state (e.g., stress level and alertness) and task performance metrics (e.g., target identification and marksmanship) from a wide assortment of physiological sensor data (both labeled and unlabeled) including information collected continuously as a function of time (EEG, FNIRS, Heart Rate) as well as data at a relatively few points in time before, during, and after a specific task (saliva and urine samples). In addition to assessing individuals, data will be collected to support the characterization of team and intergroup dynamics. We anticipate the effort will require the use of several classical as well as recent developments in machine learning and in particular recursive neural networks, manifold learning, and social network analysis.

While previous experience in theoretical and applied machine learning would be ideal, we welcome applicants with significant experience in related fields including information theory, statistical signal processing, sparse signal or image processing, compressive sensing, and distributed convex optimization.

Interested applicants should send a cover letter detailing their research interests and career goals, CV, and names and contact information of 3 references to Dr. Shuchin Aeron (shuchin@ece.tufts.edu).

From: Alexandre THIERY <a.h.thiery@nus.edu.sg>
Subject: Postdoctoral Fellow – Machine Learning for Predicting Glaucoma Progression – National University of Singapore
Date: September 10, 2017

Job description: We are looking for a bright, dynamic, and highly motivated individual to perform research in artificial intelligence with applications to ophthalmology. This is a project funded by the Biomedical Institute for Global Health Research and Technology (BIGHEART; http://bigheart.nus.edu.sg) and in collaborations in the NUS Departments of Biomedical Engineering and Statistics, and the Singapore Eye Research Institute (Top 5 worldwide).

The proposed study aims to use optical coherence tomography imaging and artificial intelligence (deep learning) to predict vision loss progression from glaucoma – a blinding ocular disorder for which mechanisms are far from being understood. Predicting glaucoma progression is subjective, heavily dependent on a clinician's experience/expertise, and requires multiple clinical tests. Such tests often need to be repeated at multiple patients' visits to overcome their inherent subjectivity. Recently, the World Glaucoma Association stated: "No specific test can be regarded as the perfect reference standard for detection of glaucomatous […] progression". In other words, clinicians cannot identify which patients are most likely to lose vision, and how quickly. This means that over- and under-treatments are inevitable. Since structural changes of the eye almost always precede vision loss in glaucoma, we aim to exploit the rich information available in 3D images of the eye to predict glaucoma

progression. We will achieve this by combining key image enhancement and artificial intelligence technologies. We believe our solution will could to better personalized treatment for the benefit of glaucoma patients.

For this project, the successful candidate will develop 3D deep learning algorithms to predict structural and functional changes of the eye. We will use a longitudinal data set of 3D optical coherence tomography images of the eye for training our algorithms. Due to data scarcity and heterogeneity of data acquisition modalities, Bayesian regularization techniques, robust uncertainty quantification and representation learning are likely to be crucial components of the methodologies developed in this project.

The candidate will also be expected to manage and lead a team of PhD students and Research Associates.

Qualification: A minimum of 2-years experience with deep learning algorithms, and several deep learning publications are required. Excellent communication and English-writing skills are also required. No background in ophthalmology is required, however, the candidate will be expected to become extremely knowledgeable in the field of clinical glaucoma in order to interact with clinicians. Candidates with PhDs in Computer Science, Electrical Engineering, Biomedical Engineering, Mathematics, Statistics or other related disciplines are encouraged to apply.

Starting Date: Immediately

Duration: An initial contract of 12 month will be provided. Upon performance, we have the funds to extend this contract for a total duration of 2-3 years.

Salary Range: S$70 to S$90K per year (dependent on qualifications)

To apply, please email a detailed CV and the names of two references to:

Dr. Michael JA Girard
Ophthalmic Engineering & Innovation Laboratory
Department of Biomedical Engineering
National University of Singapore
Email: mgirard@nus.edu.sg
Homepage: http://www.bioeng.nus.edu.sg/oeil/

From: Marko Vauhkonen <marko.vauhkonen@uef.fi>
Subject: Doctoral student positions - Smart Tomographic Sensors for Advanced Industrial Process Control (TOMOCON)
Date: September 11, 2017

Early Stage Researcher / Doctoral Student position at University of Eastern Finland (UEF), Finland, as part of
European Innovative Training Network

Smart Tomographic Sensors for Advanced Industrial Process Control (TOMOCON)

The European Marie Skłodowska-Curie Innovative Training Network TOMOCON joins 12 international academic institutions and 15 industry partners. We work together in the emerging field of industrial process control using smart tomographic sensors. The network will lay the scientific and technological fundamentals of integrating imaging sensors into industrial processes and will demonstrate its functional feasibility on lab and pilot-scale applications. Our doctoral researchers will be trained and work in the fields of process tomography hardware, software and algorithms, control systems theory and design, industrial process design, multi-physics modelling and simulation, human-computer interaction, and massive parallel data processing. More information about the network and all open positions can be found on our web page www.tomocon.eu.

Within TOMOCON we seek excellent open-minded and team-spirited doctoral students who will get unique international, interdisciplinary and inter-sectoral training in scientific and transferable skills by distinguished leaders from academia and industry. Within the TOMOCON network we offer the following doctoral student position at UEF:

ECT sensor for moisture distribution measurement in controlled microwave drying
Reference number: TOMOCON-ESR14

Microwave heating is an attractive technology for drying porous materials for example in food and pharmaceutical industries. The doctoral student shall develop electrical capacitance tomography (ECT) towards integration into control of microwave drying processes. This comprises development of an ECT sensor for capacitance measurements of porous materials, software for estimating moisture content based on ECT images and development of process model and online optimal control for a real microwave drying process. The work comprises fundamental scientific analyses, software development and technical demonstration, together with groups at universities in Lodz (Poland), Chalmers (Sweden), Karlsruhe (Germany) and different industry partners. The doctoral student will spend secondments of eight months in total for technical and scientific training at Chalmers University of Technology (Sweden), Lodz University of Technology (Poland), Karlsruhe Institute of Technology (Germany), Netrix S.A. (Poland) and Pinta Elements GmbH (Germany). The PhD degree will be awarded by University of Eastern Finland, Finland.

Requirements
* Completed suitable higher university degree (in engineering or natural science, preferably in control or electrical engineering, physics or mathematics) or an equivalent education abroad which in the country in question would qualify the person for doctoral studies
* Programming skills with Matlab, C/C++ or Python
* Experience in tomographic imaging, inverse problems or control theory will be considered as an advantage
* Strong interest in interdisciplinary scientific work (shown by a motivation letter)
* Good proficiency in English language

- Starting Date: 1st March 2018
- Contract: Full-time contract for 36 months
- Salary: Gross salary per month: 2,986
  EUR Mobility allowance per month: 500
  EUR Family allowance per month (if eligible): 416 EUR
- Information: Prof. Marko Vauhkonen, Email: marko.vauhkonen@uef.fi
- Application: Please submit your application with appendices (CV, a motivation letter, copies of the degree certificates) using the electronic application form (http://www.uef.fi/en/uef/en-open-positions) with the position reference “Early Stage Researcher (PhD student) in Applied Physics, TOMOCON-ESR14”

DEADLINE 25.10.2017 (by 24.00 hours Finnish time)

Eligibility: The candidate recruited in the TOMOCON project must be Early-Stage Researcher (ESR) and undertake transnational mobility (secondments, trainings, conferences). The candidate must be in the first four years from the date when the researcher obtained the degree entitling him or her to embark on a doctorate (e.g. master degree). It will be counted backward from the date of recruitment (in this case 01.03.2018). No doctoral degree has been awarded during these four years. The candidate can be of any nationality. The candidate must not have resided or carried out her/his main activity (work, studies, etc.) in Finland for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

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Early Stage Researcher / Doctoral Student position at University of Eastern Finland (UEF), Finland, as part of
European Innovative Training Network
Smart Tomographic Sensors for Advanced Industrial Process Control (TOMOCON)

The European Marie Skłodowska-Curie Innovative Training Network TOMOCON joins 12 international academic institutions and 15 industry partners. We work together in the emerging field of industrial process control using smart tomographic sensors. The network will lay the scientific and technological fundamentals of integrating imaging sensors into industrial processes and will demonstrate its functional feasibility on lab and pilot-scale applications. Our doctoral researchers will be trained and work in the fields of process tomography hardware, software and algorithms, control systems theory and design, industrial process design, multi-physics modelling and simulation, human-computer interaction, and massive parallel data processing. More information about the network and all open positions can be found on our web page www.tomocon.eu.

Within TOMOCON we seek excellent open-minded and team-spirited doctoral students who will get unique international, interdisciplinary and inter-sectoral training in scientific and transferable skills by distinguished leaders from academia and industry. Within the TOMOCON network, we offer the following doctoral student position at UEF:

Microwave tomography for control of microwave drying processes
Reference number: TOMOCON-ESR15

Microwave heating is an attractive technology for drying porous materials for example in food and pharmaceutical industries. Microwave tomography, on the other hand, provides a potential framework for estimating volumetric moisture content of porous materials during the microwave drying process. The doctoral student shall develop both the forward and inverse problem solvers for microwave tomography. The obtained tomographic image is used to estimate the volumetric moisture content of the target and this information is further applied in online optimal control of the microwave drying process. The work comprises fundamental scientific analyses, software development, and technical demonstration, together with groups at universities in Liberec (Czech Republic) and Karlsruhe (Germany) and an industry partner. The doctoral student will spend secondments of eight months in total for technical and scientific training at Technical University of Liberec (Czech Republic), Karlsruhe Institute of Technology (Germany) and Vötsch Industrietechnik GmbH (Germany). The PhD degree will be awarded by University of Eastern Finland, Finland.

Requirements
 * Completed suitable higher university degree (in engineering or natural science, preferably in physics or mathematics) or an equivalent education abroad which in the country in question would qualify the person for doctoral studies
 * Programming skills with Matlab, C/C++ or Python
 * Experience in inverse problems, mathematical modeling and related numerical methods will be considered as an advantage
 * Strong interest in interdisciplinary scientific work (shown by a motivation letter)
 * Good proficiency in English language

- Starting Date: 1st March 2018
- Contract: Full-time contract for 36 months
- Salary: Gross salary per month: 2,986
  EUR Mobility allowance per month: 500
  EUR Family allowance per month (if eligible): 416 EUR
- Information: Senior researcher, Dr., Timo Lähivaara, Email: timo.lahivaara@uef.fi
- Application: Please submit your application with appendices (CV, a motivation letter, copies of the degree certificates) using the electronic application form (http://www.uef.fi/en/uef/en-open-positions) with the position reference “Early Stage Researcher (PhD student) in Applied Physics, TOMOCON-ESR15”

DEADLINE 25.10.2017 (by 24.00 hours Finnish time)

Eligibility: The candidate recruited in the TOMOCON project must be Early-Stage Researcher (ESR) and undertake transnational mobility (secondments, trainings, conferences). The candidate must be in the first four years from the date when the researcher obtained the degree entitling him or her to embark on a doctorate (e.g. master degree). It will be counted backward from the date of recruitment (in this case 01.03.2018). No doctoral degree has been awarded during these four years. The candidate can be of any nationality. The candidate must not have resided or carried

out her/his main activity (work, studies, etc.) in Finland for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

Submitted by:
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From: Sydney G. <sydney@caltech.edu>
Subject: Postdoctoral Fellowships at Caltech
Date: September 29, 2017

Caltech's Computing and Mathematical Sciences (CMS) department announces openings for postdoctoral fellowships, starting in Fall 2018.

CMS runs an active, interdisciplinary postdoctoral program that typically has upwards of 20 postdoctoral scholars in any given year. These postdoctoral scholars are sponsored by individual faculty and research groups as well as through cross-cutting centers such as the Center for the Mathematics of Information (CMI, http://www.cmi.caltech.edu/), the Social and Information Sciences Laboratory (SISL,https://www.lindeinstitute.caltech.edu/research/SISL), the Institute for Quantum Information (IQIM, http://www.iqim.caltech.edu/), the Resnick Institute (http://www.resnick.caltech.edu/), and the Molecular Programming Project (http://www.molecular-programming.org/). This year, the following postdoc programs will be accepting applications through this posting. Many of these programs will recruit multiple postdoctoral scholars.

- The von Karman Postdoctoral Instructorship Program in Applied and Computational Mathematics: http://www.cms.caltech.edu/about/vonkarman
- The DOLCIT Postdoctoral Fellowship Program: http://www.cms.caltech.edu/about/dolcit
- The Center for the Mathematics of Information (CMI) Postdoctoral Fellowship Program: http://www.cms.caltech.edu/about/cmi

Please submit applications at https://www.mathjobs.org/jobs/fellowship/10739.

We are an equal opportunity employer and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin, disability status, protected veteran status, or any other characteristic protected by law.

Caltech is committed to working with and providing access and reasonable

accommodations to applicants with physical or mental disabilities. To request disability accommodations for any part of the interview or hiring process, please contact 626-395-4555 for assistance or contact sydney@caltech.edu.

Caltech is required by law to record ethnic/racial and gender data on the Institute's workforce. We therefore are requesting that you please provide such information as part of the application process. Refusal to do so will not result in any adverse employment action. This information is confidential and will be communicated only as permitted by applicable law.

Submitted by:
Sydney Garstang, Outreach Manager
Computing and Mathematical Sciences
California Institute of Technology

From: "Ammari Habib" <habib.ammari@sam.math.ethz.ch>
Subject: New book
Date: September 3, 2017

I would like to announce in IPNet Digest the publication of this book
on multi-wave and super-resolution medical imaging. The link is here
http://www.worldscientific.com/worldscibooks/10.1142/q0067
[From the website:
Modeling and Simulation in Medical Imagine: Volume 2
Multi-Wave Medical Imaging
Mathematical Modelling & Imaging Reconstruction
Authors: Habib Ammari, Josselin Garnier, Hyeonbae Kang, Loc Hoang Nguyen, Laurent Seppecher

Super-Resolution imaging refers to modern techniques of achieving resolution below conventional limits. This book gives a comprehensive overview of mathematical and computational techniques used to achieve this, providing a solid foundation on which to develop the knowledge and skills needed for practical application of techniques. Split into five parts, the first looks at the mathematical and probabilistic tools needed, before moving on to description of different types of imaging; single-wave, anomaly, multi-wave and spectroscopic and nanoparticle.
As an important contribution to the understanding of super-resolution techniques in biomedical imaging, this book is a useful resource for scientists and engineers in the fields of biomedical imaging and super-resolution, and is self-contained reference for any newcomers to these fields.
--Ed.]

From: <noreply@iopscience.org>
Subject: Inverse Problems, Volume 33, Number 10, October 2017
Date: September 20, 2017

Inverse Problems October 2017 Volume 33, Number 10

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http://iopscience.iop.org/issue/0266-5611/33/10

From: <noreply@degruyter.com>
Subject: Contents, 'Journal of Inverse and Ill-posed Problems'
Date: September 27, 2017

Journal of Inverse and Ill-posed Problems October 2017 Volume 25, Issue 5

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https://www.degruyter.com/view/j/jiip.2017.25.issue-5/issue-files/jiip.2017.25.issue-5.xml
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