

SECOND ANNOUNCEMENT AND CALL FOR PAPERS

5th INTERNATIONAL CONFERENCE ON INVERSE PROBLEMS IN ENGINEERING: THEORY AND PRACTICE

July 11-15, 2005

Cambridge, UK

CONFERENCE SYNOPSIS

In recent years there has been a considerable increase in the number of international conferences in inverse problems. Whilst there is an obvious aspect to consolidate the theory of inverse problems, of equal importance is the need of engineering applications. We consider that this is the strongest point of this series of conferences which should be maintained. Another aspect which can also be developed in this frame is the need of relating to experimental data and practical experiments in general.

CONFERENCE SCOPE

The proposed conference is intended to bring together researchers from various fields with a common interest in inverse methods. Many existing challenges in engineering can be solved by the application of inverse methods, and the conference is intended to facilitate exchange of ideas between researchers from different fields. It is of importance to stress that the conference will bring together both the theory and practice on inverse problems. The conference will emphasize a broad range of deterministic, statistical, mathematical, computational and experimental approaches that can be applied to the solution of inverse problems within acoustics, elasticity, electromagnetism, fluid and solid mechanics, heat and mass transfer, optics, porous media, etc.

The sessions will be centered on the following types of applications:

- **Algorithms, theoretical and mathematical aspects**
- **Boundary condition reconstruction**
- **Initial condition reconstruction**
- **Parameter estimation**
- **Experimental design**
- **Imaging, tomography and inverse scattering**
- **Non-destructive evaluation**
- **Inverse design and optimization**
- **Source estimation**
- **Model identification**
- **Shape, size and location detection**
- **Remote sensing**
- **Signal and noise processing**

However, participants who wish to make presentations in other fields will be encouraged.

CONFERENCE FORMAT

Conference registration will begin on Sunday 10th July, and the Conference will close around 1 p.m. on Friday 15th July. Daily sessions will be held in the morning, afternoon or evening, leaving the evening or afternoon open for private interactions, site-seeing and possible theatre excursion. It is planned to hold a day industrial inverse problems workshop.

A range of accommodation will be available, from ensuite rooms to bed sitting rooms, in order to try to relate to all budgets.

Keynote talks will be delivered by the following prominent invited speakers in the field of inverse problems:

- **M. Bonnet** (Ecole Polytechnique, France) "*Topological expansion for 3D inverse scattering*".
- **R. Kress** (University of Goettingen, Germany) "*Hybrid methods for inverse boundary value problems*".
- **D.A. Murio** (University of Cincinnati, USA) "*Some inverse problems in systems of nonlinear parabolic equations*".
- **F. Natterer** (Muenster University, Germany) "*Inverse Helmholtz problems and tomography*".

SUBMISSION, SELECTION and PUBLICATION of CONTRIBUTED PAPERS

The author instructions for the preparation of the full paper are attached. The submitted papers will be reviewed by two referees. The final version of accepted papers must be sent before April 30, 2005, which is the final deadline. The internationally refereed proceedings (with ISB number) **will be available on registration at the conference.**

Please note that only accepted papers for which at least one of the authors registers for the conference will be published in the conference proceedings. We have received a larger number of abstracts (over 185) than expected. Hence could you please indicate (when you submit the full paper) whether you would prefer an oral or poster presentation. Further, each participant will be restricted to a maximum of one oral presentation (the other contributions can be allocated to a poster session).

SUMMARY OF IMPORTANT DATES

Full papers due for review: December 30, 2004 (early December 17, 2004 will be acknowledged).

Notification of paper evaluations: February 28, 2005.

Accepted papers due: April 30, 2005.

CO-SPONSORS

London Mathematical Society, Institute of Physics, EPSRC, AIChE, Journal of Inverse and Ill-Posed Problems, Inverse Problems, Inverse Problems in Science and Engineering, NSF, British Computing Society, Royal Society.

VISA REQUIREMENTS

UK requires visas for several countries. Please, check with the UK Embassy in your country if you need a visa to be admitted to UK. Apply for visa as soon as possible.

CONFERENCE REGISTRATION FEES

- The conference registration fee will be either £600, or £675, according to whether the participant opts for a standard room or an en suite one. However, it should be stressed that the number of en suite rooms is limited to around 75 and will be allocated on a first come, first served, principle as participants register and pay. This price will include the Conference proceedings, Reception, Accommodation, Breakfast and Evening meal, Conference/Teas/Biscuits throughout the conference, plus expenses incurred in Conference overheads, such as room hire, printing, etc.
- There will be a limited number of selective bursaries for postgraduate students.
- Unfortunately, the College is only able to offer a limited number of double rooms by combining 2 of the en suite rooms and hence the additional charge for this accommodation, breakfast and evening meal is £300 for the non participant. In the light of this, we will be providing a list of hotels accommodation within Cambridge, however it should be stressed that Cambridge hotels, like in London, tend to be expensive.
- For participants non residing in College the conference registration fee will be £300.
- For the registration form and method of payment see below.

Cambridge Conference ECI 2005

- If you wish to pay by credit card, you will need to use a Master Card, Visa Card, American Express or EUROCARD. Submit only one form. Upon sending a completed form to Dr. Daniel Lesnic, Department of Mathematics, University of Leeds, LEEDS, LS2 9JT, UK, (fax from within UK 0113-343-5090, and 00-44-113-3435090 from outside UK), the amount will be charged to your credit card and this will be confirmed via e-mail.
- If you wish to pay by cheque, cheques in UK pounds should be made payable to "**The University of Leeds (Cambridge Conference 2005)**" and sent with the completed form to Dr. Daniel Lesnic at the above address.
- If your Institution/Company/University wishes to pay directly into the University of Leeds Bank account then could you please request further details from Dr. Lesnic: e-mail: amt5ld@maths.leeds.ac.uk

Personal Information

Title:

First Name:

Surname:

Badge Name:

E-mail:

Postal Address

Institution/Company/University:

Department:

Address:

City:

State/County:

Postcode:

Country:

Telephone:

Fax:

Invoice Address (if different from above):

Method of Payment

Credit Card (Visa, Master Card, American Express, EUROCARD) Tick accordingly

Name of Card Holder:

Credit card number:

Expiry date:

Credit card security code (3 or 4 digit number on signature strip):

Amount being paid (in £):

Require invoice: Yes, No, Delete accordingly.

Delegates who cancel their registration due to special circumstances more than 60 days before the Conference and do not have a paper published in the proceedings will receive a complete refund minus the price of certain fixed expenditure. Fees remain payable in full for cancellation within 30 days of the start of the Conference.

Instructions for Authors for the Preparation of the Full Paper

Text area: The text area of the manuscript is 16cm wide \times 24.5cm deep. All text, tables and figures must be within this area. Insert the tables and figures within the text. Please allow for **at least** 2.5cm top, bottom, right and left margins.

Page Extent: Maximum 10 pages are allowed.

Font Size: The main text should be set in 10 point times Roman font, using single line spacing, single column format and **Justified** throughout.

Style: All papers should be in English, have an abstract and conclusions in addition to introduction and technical sections. References must be at the end of the paper in alphabetical order and set in the following order: Authors Initials, Surname, Title, Source, Year, Volume, Page numbers.

Please put the following heading (in italic font) **only** on the first page of the paper:

Proceedings of the 5th International Conference on Inverse Problems in Engineering: Theory and Practice, Cambridge, UK, 11-15th July 2005

Please do not number the pages. A sample of the paper is enclosed. It is important to stress that a paper will not be accepted if it does not follow the aforementioned format.

Authors should send the PDF file of the paper by e-mail to:

D. Lesnic (e-mail: amt5ld@amsta.leeds.ac.uk)

or

L. Elliott (e-mail: lionel@amsta.leeds.ac.uk)

as an attachment before 30 December 2004.

The internationally refereed proceedings (with ISB number) will be available at the conference site. However, **please note that only the accepted papers for which at least one of the authors registers for the conference will be published in the conference proceedings.**

AN INVERSE COEFFICIENT IDENTIFICATION PROBLEM IN A DYNAMIC PLATE MODEL

D. LESNIC¹ and L. MARIN²

¹ *Department of Applied Mathematics, University of Leeds, Leeds LS2 9JT, UK*

e-mail: amt5ld@maths.leeds.ac.uk

² *School of Environment, University of Leeds, Leeds LS2 9JT, UK*

e-mail: liviu@env.leeds.ac.uk

Abstract - We consider the problem of identifying the spatially varying flexural rigidity of a plate using an observed deflection solution of the direct problem of a dynamic linear Kirchhoff plate model. Then, for this inverse problem, several uniqueness and continuous dependence results are developed. The case of harmonic conductivities is also investigated in detail.

1. INTRODUCTION

Many rocket propulsion laboratory structures are designed to serve as a test bed for the implementation and evaluation of control algorithms for large angle slewing of spacecraft with flexible appendages. There are many other applications. Furthermore, these structures are specifically designed to exhibit structural modes and damping characteristics representative of realistic large flexible space structures, [1].

The difficulties involved in the design of practical and efficient control laws for large spacecraft (e.g., the inherent infinite dimensionality of the system, a large number of closely spaced modal frequencies, high flexibility, a fuel-limited, hostile, highly variable environment, etc.) have stimulated research into the development of system identification and parameter estimation procedures which will yield high fidelity models. A particular area of interest involves schemes for the estimation of material parameters describing, for example, mass, inertia, and flexural rigidity or damping properties in distributed models for the vibration of viscoelastic systems—specifically, mechanical beams, plates and the like. The determination of the elastic properties of a deformable (or bending) material is one of the central problems in computational material diagnostics, [9].

The partial differential equation

$$m \frac{\partial^2 u}{\partial t^2} + \nabla^2 (a \nabla^2 u) = f \quad (1)$$

has been considered at the steady-state in [12, 24] as a dynamic linear Kirchhoff plate model which takes into account moments parallel to the x - and y -axes with no twisting.

Some numerical results are presented in Figure 1 and Table 1 of Section 4. Alternatively, if the flexural rigidity is harmonic, one can extend the numerical method of [21] related to hyperbolic problems. Future work will be concerned to extensions to time-dependent situations.

Acknowledgement

The authors would like to acknowledge some financial support received from the EPSRC.

REFERENCES

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3. A. Rap, The Cauchy problem for the steady-state convection-diffusion equation using BEM, *Advances in Boundary Element Techniques IV*, (eds. R. Gallego and M.H. Aliabadi), Queen Mary, University of London, UK, 2003, pp.281-286.
4. X. Wen and P.J. Heggs, Two-dimensional analysis of polygonal fin assemblies using the boundary element method, *Fourth European Thermal Sciences Conference (ETSC2004)*, Birmingham, UK, 29-31 March, 2004, pp.15-25.