Experimental estimation of local heat-transfer coefficient in coiled tubes with corrugated wall

AIP 2015

Applied Inverse Problems

Conference in
Helsinki, Finland
May 25-29, 2015

Book of Abstracts

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CT6: Engineering Applications

SCHEDULED: Contributed Talks Friday, May 29 08:30–10:00 in F26-LS115

ORGANIZER: Christian Nittinger, *University of Münster, Germany*

DESCRIPTION: Inverse problems in engineering applications.

TALKS DETAILS:

1. **Experimental estimation of local heat-transfer coefficient in coiled tubes with corrugated wall**
   Fabio Bozzoli, *University of Parma, Italy*

   ABSTRACT. The present paper presents the application of an inverse analysis approach to experimental infrared temperature data with the aim of estimating the local convective heat transfer coefficient for forced convection flow in coiled pipe having corrugated wall. The estimation procedure here adopted is based on the solution of the inverse heat conduction problem within the wall domain by adopting the temperature distribution on the external coil wall as input data of the inverse problem: the unwanted noise in filtered out from the infrared temperature maps in order to make feasible the direct calculation of its Laplacian, embedded in the formulation of the inverse heat conduction problem in which the convective heat transfer coefficient is regarded to be unknown. Preliminary results are presented and discussed.

2. **Analysis and numerical solution of the nonlinear evolutional inverse problem related to elastoplastic torsional equation**
   Salih Tatar, *Zirve University, Turkey*

   ABSTRACT. This study is devoted to mathematical analysis and numerical solution of the nonlinear evolutional inverse problem related to elastoplastic torsional equation. Since the real torsion process of the materials is not quasi-static, we propose an evolutional model. After we define the direct and the inverse problems, we investigate existence and uniqueness of the solutions. The direct problem is solved using a semi-implicit finite difference scheme. The inverse problem is solved using the semi-analytic inversion method (also known the fast algorithm). CANCELLED

3. **Magnetotelluric inversion with wavelet sparsity regularization**
   Christian Nittinger, *Institute of Geophysics, University of Münster*

   ABSTRACT. The magnetotelluric method utilizes natural variations of the geomagnetic field to infer the electrical conductivity distribution of the earth's interior. Magnetotelluric inversion models are usually regularized with smoothing constraints to outweigh the under-determinacy of the heavily ill-posed non-linear problem. We present an inverse scheme that promotes sparsity of the inverse estimate in a wavelet domain. The algorithm produces sparse solutions that explain the data using a linear L2-L1 solver in a non-linear gauss-newton like minimization scheme. We present the results of the inversion scheme applied on synthetic as well as on real magnetotelluric data.