

**PROCEEDINGS**

**Foreword**: Finding ‘causes’ from measured ‘consequences’ using a mathematical model linking the two is an inverse problem. This is met in different areas of physical sciences, especially in Heat Transfer. Techniques for solving inverse problems as well as their applications may seem quite obscure for newcomers to the field. Experimentalists desiring to go beyond traditional data processing techniques for estimating the parameters of a model with the maximum accuracy feel often ill prepared in front of inverse techniques.

In order to avoid biases at different levels of this kind of involved task, it seems compulsory that specialists of measurement inversion techniques, modelling techniques and experimental techniques share a wide common culture and language. These exchanges are necessary to take into account the difficulties associated to all these fields. It is in this state of mind that this school is proposed.

The METTI Group (Thermal Measurements and Inverse Techniques), which is a division of the French Heat Transfer Society (SFT), has already run or co- organized six similar schools, in the Alps (Aussois, 1995 and 2005), in the Pyrenees (Bolquère-Odeillo, 1999), in Brasil (Rio de Janeiro, 2009), in Bretagne (Roscoff, 2011) and in Pays Basque (Biarritz, 2015). The seventh edition of the school was again open to participants from all over the world with the support of the Eurotherm Committee.

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**NB: The next edition of this school, Metti 8, will take place from Sept. 24 to 29, 2023 in the “Ile d’Oléron” in France, see https://metti8.sciencesconf.org/**

Lecture 1 - **Getting started with problematic inversions with three basic examples**

P. Le Masson, O. Fudym, J.-L. Gardarein, D. Maillet

Lien vers fichier: L1-Le Masson final-reluJLB.pdf

Lecture 2 - **Advanced measurents with contact in heat transfer: principles, implementation and pitfalls**

F. Lanzetta, B. Garnier

Lien vers fichier: L2-Lanzetta Garnier final-reluJLG.pdf

Lecture 3 - **Basics for linear inversion: the white box case**

F. Rigollet, D. Maillet

Lien vers fichier: L3-Rigollet final\_JLB+DM+TP+FR.pdf

Lecture 4 **-** Measurements without contact in heat transfer

**Part A** **- Radiation thermometry : principles, implementation and pitfalls**

J.C. Krapez

Lien vers fichier: L4-part A-KRAPEZ apres coup.pdf

**Part B** - **Quantitative Infrared Thermography**

H. Pron, L. Ibos

Lien vers fichier: L4-part B-Ibos final.pdf

Lecture 5 - **Nonlinear parameter estimation problems: tools for enhancing metrological objectives**

B. Rémy, S. André and D. Maillet

Lien vers fichier: L5-Rémy et al final\_JLB.pdf

Lecture 6 - **Inverse problems and regularized solutions**

J.C. Batsale, O. Fudym, C. Le Niliot

Lien vers fichier: L6-Le Niliot final-relu DM-JCB-V4-8Juin&19Juillet22.pdf

Lecture 7 - Types of inverse problems, model reduction, model identification   
 **Part A** **– Experimental identification of low order model**

J.-L. Battaglia

Lien vers fichier: L7-part A-Battaglia final-ReluDM2fois&JLB-25Juillet22.pdf

**Part B** **–** **Modal reduction for ther Y. Jarny, D. Mailletmal problems: Core principles and presentation of the AROMM method**

F. Joly, Y. Rouizi, O. Quéméner

Lien vers fichier: L7-part B-Quemenerfinal\_ReluDM.pdf

Lecture 8 - **Function estimation in inverse heat transfer problems**

Y. Favennec, P. Le Masson, Y. Jarny, D. Maillet

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Lecture 9 **- The use of techniques within the Bayesian framework of statistics for the solution of inverse problems**

H.R.B. Orlande: Jean-Luc

Lien vers fichier: L9-Orlande final\_JLB-1.pdf