

METTI 8: Post-school report, program and flyer

The 8th edition of the Advanced Fall School, in "Thermal Measurements and Inverse Techniques", organized by the Société Française de Thermique, with the support of the International Center of Heat and Mass Transfer and of the Eurotherm Committee, took place on the Ile d'Oléron (France), in a CNRS center, from September 24 to 29, 2023.

This edition of METTI 8 was a real success, reaching its maximum capacity of 97 participants from 10 different countries (India, Brazil, Poland, Kazakhstan, Switzerland, Italy, Belgium, Ireland and France). This highly diverse group included 45 academics, 42 PhD students and post-doctoral researchers from 28 different laboratories, as well as 10 people from industry.

The school was organized around 9 plenary lectures, 1 conference and 15 tutorials offered over 36 time slots.

The school program (also available at <https://metti8.sciencesconf.org/>), and the flyer are posted below.

Lectures (given in English) [[Lectures book](#)]

Lectures were given from 9:00 to 12:00 every morning from Monday to Friday on the following courses: generalities on inverse problems, linear and nonlinear estimation, contact and non-contact thermal sensors, measurement noise, large scale optimization, regularization, function estimation, signal processing, model reduction or identification, etc.

- **LIST OF LECTURES**

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

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

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

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

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

Part B - **Quantitative Infrared Thermography**

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

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

Lecture 7 - **Types of inverse problems, model reduction, model identification**

Part A – **Experimental identification of low order model**

Part B – **Modal reduction for thermal problems: Core principles and presentation of the AROMM method**

Lecture 8 - **Optimization tools dedicated to function estimation in inverse heat transfer problems**

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

Invited Conference (V. Ozenne) - **Contactless thermal measurements using MRI : applications in interventional radiology and perspectives in pathophysiology**

Tutorials (given in English) [[Tutorials book](#)]

Tutorials were held in the “La vieille Perrotine Centre” between 17:00 and 20:00 from Monday to Thursday. They included an experimental and/or a numerical part. Each participant was able to attend between 6 and 8 tutorials according to the schedule.

• LIST OF TUTORIALS

- Tutorial 1 - **Multispectral Pyrometry**
- Tutorial 2 - **Thermophysical Characterization by Hot Plates**
- Tutorial 3 - **Temperature and heat Flux measurements**
- Tutorial 4 - **InfraRed Thermography / Material and building**
- Tutorial 5 - **Periodic Heating methods for materials thermal characterization**
- Tutorial 6 - **Model Reduction by modal analysis**
- Tutorial 7 - **Identification of Transfer Functions and of Boundary conditions**
- Tutorial 8 - **Heat Flux identification**
- Tutorial 9 - **Bayesian approach for Inversion**
- Tutorial 10 - **ThermoMechanical inversion**
- Tutorial 11 - **Thermal imaging in semi-transparent media**
- Tutorial 12 - **Optimal Wavelengths Selection Criteria for Multispectral Pyrometry**
- Tutorial 13 - **Optimal Experiment Design for inverse heat conduction problem**
- Tutorial 14 - **On the use of the Approximation Error Model Approach in Inverse Problems**
- Tutorial 15 - **Experimental identification of mobile heat sources**

Monday, September 25th		Tuesday, September 26th		Wednesday, September 27th		Thursday, September 28th		Friday, September 29th	
8:00 - 8:15	Welcome								
8:15 - 9:00	L1 - Getting started with inversion, P Le Masson, JL Gardarein	8:30 - 10:00	L4 - Measurements without contact in heat transfer, T Pierre, L Ibos	8:30 - 10:00	L6 - Inverse problems and regularized solutions, C Le Niliot	8:30 - 10:00	L8 - Function estimation and Large scale estimation problems, Y Favennec, P Le Masson	8:30 - 10:00	Tutorial session 9 T8 : Gardarein, Battaglia, Gaspar T13 : Berger, Gasparin T14 : Pacheco, Orlando T15 : Bauzin, Cherikh, Hocine
9:00 - 10h30	L2 - Advanced measurements with contact in heat transfer: : principles, implementation and pitfalls, F Lanzetta, B Garnier	10h00 - 10h45	Coffee Break around posters	10h00 - 10h45	Coffee Break around posters	10h00 - 10h45	Coffee Break around posters	10:00 - 10:30	Coffee Break around posters
10h30 - 10h50	Coffee Break around posters								
10h50 - 12:20	L3 - Basics for linear inversion, the white box case, F Rigollet, D Mailliet	10:45 - 12h15	L5 - Non linear parameter estimation problems, B Rémy	10:45 - 12h15	L7 - Types of inverse problems, model reduction, model identification, O Quémener, Y Rouzi, JL Battaglia	10:45 - 12h15	L9 - The Use of Techniques within the Bayesian Framework of Statistics for the Solution of Inverse Problems, H Orlando	10:30 - 11:30	Invited Conference : Contactless thermal measurements using MRI, V Ozenne
12:20 - 13:30	Lunch	12:15 - 13:30	Lunch	12:15 - 13:30	Lunch	12:15 - 13:30	Lunch	12:30 - 13:30	Lunch
13:30 - 16:40	Free time	13:30 - 16:40	Free time	13:30 - 16:40	Free time	13:30 - 16:40	Free time		
16:40 - 18h10	Tutorial session 1 T2.1 : Pierre, Le Masson, Geslain T3 : Lanzetta, Garnier T4.3 : Dumoulin T7.1 : Mailliet	16:40 - 18h10	Tutorial session 3 T1 : Duvaut, Pompidou T2.3 : Pierre, Le Masson, Geslain T4.1 : Ibos, Meulemans T7.1 : Mailliet	16:40 - 18h10	Tutorial session 5 T2.2 : Pierre, Le Masson, Geslain T4.1 : Ibos, Meulemans T6.1 : Joly, Quémener T11 : Chevalier	16:40 - 18h10	Tutorial session 7 T8 : Gardarein, Battaglia, Gaspar T9 : Demeyer T12 : Rodiet T14 : Pacheco, Orlando		
18:10 - 18:30	Pause	18:10 - 18:30	Pause	18:10 - 18:30	Pause	18:10 - 18:30	Pause		
18:30 - 20:00	Tutorial session 2 T2.2 : Pierre, Le Masson, Geslain T3 : Lanzetta, Garnier T4.3 : Dumoulin T7.2 : Rémy, Barthélémy	18:30 - 20:00	Tutorial session 4 T2.1 : Pierre, Le Masson, Geslain T4.2 : Ibos, Meulemans T5 : Perez T7.2 : Rémy, Barthélémy	18:30 - 20:00	Tutorial session 6 T2.3 : Pierre, Le Masson, Geslain T4.2 : Ibos, Meulemans T6.1 : Joly, Quémener T6.2 : Rouzi, Gaume	18:30 - 20:00	Tutorial session 8 T6.2 : Rouzi, Gaume T9 : Demeyer T10 : Bauzin, Cherikh, Hocine T13 : Berger, Gasparin		