

Foreword to the special issue of RGT to QIRT

The continual evolution of techniques, devices and applications has become a permanent challenge for researchers and engineers working in the field of infrared thermography. During the last decade, infrared thermography techniques have changed impressively because of two factors. The first factor has been the improvement of infrared thermographic systems which can now be regarded as being true metrological apparatuses, with enhanced temperature and spatial resolutions, high frame rates and in some cases lock-in and box-car functions. The second factor is the growing awareness of the valuable role of thermal modelling. These two factors led to the emergence of the concept of "Quantitative InfraRed Thermography" or QIRT. The QIRT acronym appeared for the first time as the title of an Eurotherm Seminar (number 27) organised by the ONERA, in Châtenay-Malabry (France), in 1992.

At the end of the first QIRT Conference it was decided to create a QIRT Working Group to organise such a conference every two years. The thermographic community has participated in QIRT'94 (Eurotherm 42) organised by the University of Naples, in Sorrento (Italy), to QIRT'96 (Eurotherm 50) organised by the IKP of the University of Stuttgart (Germany), and to QIRT'98 (Eurotherm 60) organised by the Technical University of Łódź in Łódź (Poland).

The success of these conferences is, in large part, the result of the interest and work of the heat transfer community. This is the reason why the present special issue of the *Revue Générale de Thermique* devoted to QIRT is welcomed.

The present issue has been possible thanks to the recognition by the Société Française des Thermiciens (SFT) and Elsevier of the interest of these techniques for the thermal science community, and to the decision of the QIRT Working Group to prepare this issue.

The members of the QIRT WG¹ must be acknowledged for their participation in the solicitation of potential authors, the selection of proposed papers and the review of the selected papers.

The spirit of this issue was to present a wide overview of the possible applications the infrared thermography technique, with emphasis on the thermal aspects involved.

First paper deals with fundamental thermal problems :

- *Infrared Thermography Applied to the Resolution of the Inverse Heat Conduction Problems: Recovery of Heat Line Sources and Boundary Conditions*, by C. Le Niliot, P. Gallet, from the CNRS/IUSTI of Marseille;

1. The WG is composed of representatives of European countries and Canada. The present composition is the following : Darryl Almond (United Kingdom), Daniel Balageas (France), Jean-Marie Buchlin (Belgium), Gerd Busse (Germany), Giovanni Maria Carlo-magno (Italy), Xavier Maldague (Canada), Piotr Pregowski (Poland), Jukka Rantala (Finland), Srecko Svaic (Croatia) and Vladimir Vavilov (Russia).

various fields of application of QIRT are illustrated. The first one is the fluid mechanics and the convective heat transfer which are the subject of three papers :

- *Wall Heat Transfer in a Static and Rotating 180° Turn Channel by Quantitative Infrared Thermography*, by Gennaro Cardone, Tommaso Astarita, Giovanni Maria Carlomagno, from the University Federico II of Naples;
- *Natural and Forced Convective Heat Transfer on Slender Cylinders*, by Jean-Marie Buchlin, from the von Karman Institute for Fluid Dynamics, in Brussels;
- *Experimental Characterisation of the Convective Heat Transfer in a Vortex-Wall Interaction*, by Philippe Reulet, Muriel Marchand and Pierre Millan, from ONERA (Toulouse).

The use of thermal diagnostics for non destructive evaluation is presented in four papers demonstrating the versatility of infrared thermography:

- *Corrosion Evaluation by Thermal Image Processing and 3D Modeling*, by Ermanno Grinzato and Vladimir Vavilov, respectively from CNR-ITF in Padova and Tomsk Polytechnic University;
- *Time-Resolved Infrared Radiometry with Step Heating - A Review*, by Robert Osiander and Jane W. M. Spicer from the Applied Physics Laboratory of the Johns Hopkins University;
- *Lock-in Thermography for Nondestructive Evaluation of Materials*, by Datong Wu and Gerd Busse, from the IKP of the University of Stuttgart;
- *A Study of Depth using Neural Networks in Pulsed Phase Thermography: Modelling, Noise, Experiments*, by Xavier Maldague, Y. Largouët, J.-P. Couturier, from the Electrical and Computing Engineering Department of the Laval University of Quebec.

The application to solid mechanics is illustrated by one paper:

- *Statistical Treatment Applied to Infrared Thermoelastic Analysis of Applied and Residual Mechanical Stresses*, by S. Offermann, C. Bissieux, Jean-Louis Beaudoin, from the UTAP/LEO of the University of Reims Champagne Ardenne.

The last domain explored is the field of electromagnetic phenomena, in which QIRT can be useful too:

- *EMIR: a Photothermal Tool for Electromagnetic Phenomena Characterization*, by Daniel Balageas and Patrick Levesque from ONERA (Châtillon).

Although far from exhaustiveness, let this collection of papers, selected for their originality, or their comprehensive views, be a milestone for thermographers and more generally for thermal researchers and engineers. This is the hope of the QIRT WG.

Daniel Balageas
Chairman of QIRT WG