

## PREFACE

Welcome to Québec City (Canada) for this 10th edition of the **International conference on Quantitative Infrared Thermography (QIRT<sup>10</sup>)**! We at the *Electrical and Computer Engineering* Department, Canada Research Chair on *Multipolar Infrared Vision Infra-rouge Multipolaire (MIVIM)* of Université Laval are pleased to host this major event of infrared thermography which takes place July 27-30th, 2010 in Pavillon A. Desjardins.

For its 10th anniversary, the QIRT conference moves out of Europe for the first time truly indicating its international stature. QIRT conferences<sup>1</sup> started in 1992 in Paris (France) as *Eurotherm Seminars* and have been held every two year since then: Sorrento, Italy(1994), Stuttgart, Germany (1996), Lodz, Poland (1998), Reims, France (2000), Dubrovnik, Croatia (2002), Brussels, Belgium (2004), Padova, Italy (2006) and Krakow, Poland (2008). In 2002, QIRT conferences became independent international events under the umbrella of the **QIRT Working Group<sup>2</sup> (QIRT WG)** and they are now among the most important international events in this fast growing field.

Moreover, the QIRT WG launched the *Journal of QIRT (J. QIRT)* in 2004. The *J. QIRT* publishes peer-reviewed papers which are either selected from their high quality in the QIRT conference proceedings (enlarged, revised versions) or directly contributed by authors. For 2010, with its 7th volume, the *J. QIRT* is now indexed within large academia institutions.

QIRT conferences bring together specialists from industry and academia, who share an active interest in the latest developments of science, experimental practices and instrumentation, related to infrared thermography. More specifically, QIRT<sup>10</sup> emphasizes the following themes:

- State of the art and evolution in the field of infrared scanners and imaging systems allowing quantitative measurements and related data acquisition and processing.
- Integration of thermographic systems and multispectral analysis. Related problems like calibration and characterization of infrared cameras (mono and multidetector systems), emissivity determination, absorption in media, spurious radiations, three dimensionality of observed objects, certification and standardization.
- Thermal effects induced e.g. by electromagnetic fields, elastic waves or mechanical stresses.
- Application of infrared thermography to radiometry, thermometry and physical parameters identification in all fields such as (and not limited to): industrial processes, material sciences, structure and

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1. Refer to [qirt.gel.ulaval.ca](http://qirt.gel.ulaval.ca) for more information on QIRT conferences including past proceedings.

2. The current QIRT WG members are the following: **D. Balageas**, ONERA, France (Chairman); **J.-C. Batsale**, ENSAM, Bordeaux, France; **J.-M. Buchlin**, Von Karman Institute, Belgium; **G. Busse**, University of Stuttgart, Germany; **G. Carlomagno**, University of Napoli, Italy; **E. Grinzato**, CNR-ITC, Padova, Italy; **X. Maldague**, Université Laval, Canada; **A. Nowarkowski**, Gdansk Univ. Technology, Poland; **A. Salazar**, Universidad del País Vasco, Spain; **S. Švaic**, University of Zagreb, Croatia; **V. Vavilov**, Tomsk Polytechnic, Russia; **B. Wiecek**, Technical University of Lodz, Poland;

material non destructive evaluation, medicine, and biomedical science, fluid mechanics, cultural heritage and buildings, environment, food production.

The 165 papers from 24 countries are thus organized in the following 18 sections in a parallel three-track program:

- Biomedical Applications
- Calibration and Metrology
- Civil Engineering
- Electronics & Semiconductors
- Environment
- Fluid Dynamics & Energetics
- Image & Data Processing
- IR Signature & Recognition
- Modeling
- Monitoring & Maintenance
- Microscale Applications
- NonDestructive Evaluation & Testing
- New Technologies
- Photothermal and PhotoAcoustic techniques (special invited session<sup>1</sup>)
- Solid Mechanics
- Thermophysics
- Thermographic Signal Reconstruction method
- Works of Art & Buildings

QIRT conferences are also the opportunity to reflect current preoccupations by inviting key personalities for plenaries. In 2010, we are thus privileged to have the following presentations:

- Prof. Dr. **D. Balageas**, *Personal thoughts on the occasion of the 10th QIRT Conference.*
- Prof. Dr. **C. N. Patel**, *Infrared Photo-Thermography for Standoff Detection of Explosive Substances.*
- Prof. Dr. **A. Mandelis**, *Infrared Lock-in Carrierography (Photocarrier Radiometric Imaging) of Semiconductors and Si Solar.*
- Prof. Dr. **J.-C. Krapez**, *A combination of temperature, vegetation index, and albedo measurements obtained by airborne hyperspectral remote sensing for the evaluation of soil surface moisture.*
- Prof. Dr. **T. Sakagami**, *Development of self-reference lock-in thermography and its application to remote nondestructive inspection of fatigue cracks in steel bridges.*

As usual, QIRT10 starts with a full day of courses on the Monday (July 26th):

- **A - Basic Thermography:** Prof. V. Vavilov, Tomsk Polytechnic Institute, Russia and Prof. X. Maldague, Université Laval, Canada.
- **B - Application to Fluids:** Prof. G. M. Carlomagno, Università di Napoli Federico II, Italy.
- **C - Application to Solids:** Prof. G. Busse, Universität Stuttgart, Germany.

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1. This follows an agreement with the *International Conferences on Photoacoustic and Photo-thermal Phenomena (ICPPP)*. Special thank to Prof. Dr. A. Mandelis from University of Toronto (Ontario, Canada) who took in charge the organization of this special invited session.

- D - *Cultural Heritage and Buildings*: Prof. E. Grinzato, CNR-ITC, Padova, Italy.

Another established tradition of the QIRT conferences is the exhibition which is held concurrently with the sessions. In 2010, we thus thank the following companies and research group for their kind participation:

- FLIR ([www.flir.com](http://www.flir.com))
- Jenoptik ESW GmbH ([www.jenoptik.com/esw-wedel\\_EN](http://www.jenoptik.com/esw-wedel_EN))
- MIVIM - Université Laval ([mivim.gel.ulaval.ca](http://mivim.gel.ulaval.ca))
- Techno-Test ([www.techno-test.com](http://www.techno-test.com))
- Telops ([www.telops.com](http://www.telops.com))
- Xenics ([www.xenics.com](http://www.xenics.com))

Finally, QIRT<sup>10</sup> could not have been a success without the help of Université Laval, the official host institution, and in particular the Electrical and Computer Engineering (ECE) Department and the Canada Research Chair on *Multipolar Infrared Vision Infrarouge Multipolaire* (MIVIM). Moreover the Organizing Committee<sup>1</sup> assisted by all the students of our MIVIM group are thanked for their help. Thank is also due to Mr. Louis Dionne for his helpful assistance. Of course the support of the QIRT WG and its chairman, Dr. Daniel Balageas is acknowledged.

Special thanks are due also to all the participants who spent time and money to make this 10th edition of the QIRT conference series a true success. These proceedings want to be a tribute to this collective effort which helps the progress of this fascinating field comprising so many facets evolving continuously, for the progress of Humanity.

We wish you all a fruitful and successful QIRT<sup>10</sup> conference and a nice, memorable stay in beautiful Québec City (Canada)!

Xavier P.V. Maldague  
QIRT<sup>10</sup> Director  
Québec City (Canada) July 2010

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1. *QIRT10 Organizing Committee* members are: • from ECE-MIVIM (Université Laval): Prof. A. Bendada, Mr. M. Grenier, Dr. C. Ibarra-Castanedo, Mr. M. Klein, Prof. X. Maldague, Mr. A. Ziadi; • from Public Works, Canada: Dr. T. Colantonio; • from NRC Canada: Mr. M. Genest; from SI Termografía Infrarroja, Argentina: Dr. A. Rozlosnik; from Institut National d'Optique (INO) Canada: Mr. L. St-Laurent. Special thank also to Mr. R. Martineau, graphist at the Faculty of Sciences and Engineering (Université Laval).