
NEWSLETTER

AUGUST 2018



www.isipt.org

CONTENTS

- Forthcoming World Congress WC-IPT-9, September 2018
- World Congress WC-IPT-10, September 2020
- Are you in our WC-IPT-11 2022 World?
- Future Focussed Symposium Events
- Publications Update
- Industrial Application Case Studies
- Development of our Global Community

FORTHCOMING WORLD CONGRESS - 2018

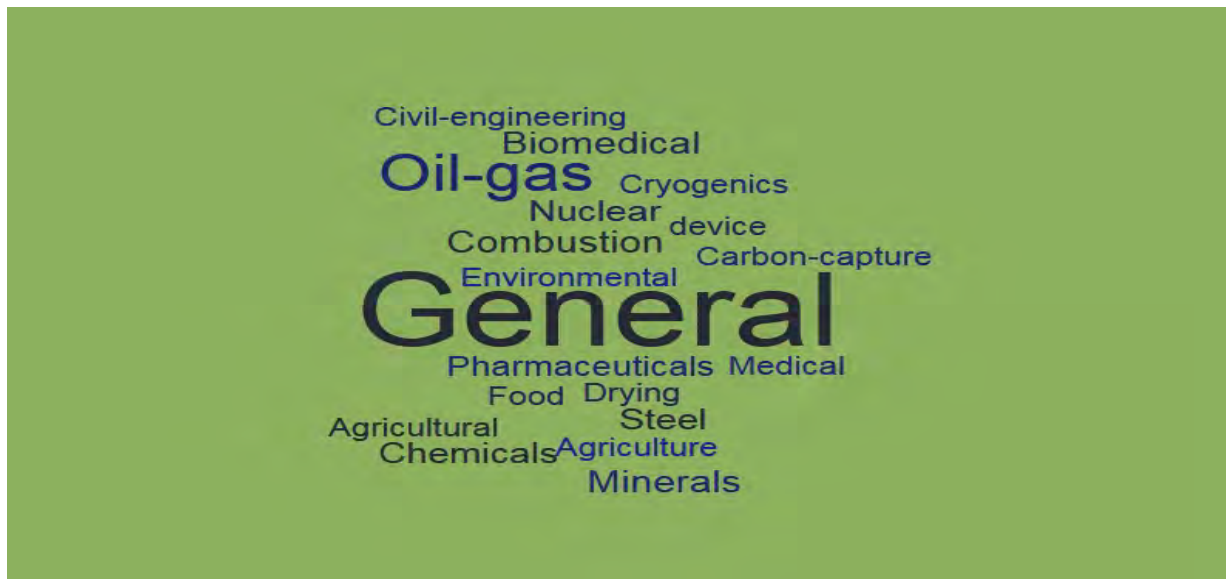


There is still time to book and attend. Our WC-IPT-9 logo uses an image of one of Bath's famous examples of classical architecture; at the time this building was completed our *ISIPT balloon* could have been a sensible way to travel. Now you can fly from almost anywhere to London Heathrow airport and arrive in Bath within a short time to review significant progress through oral and poster paper presentations; share views; and join in collaboration..

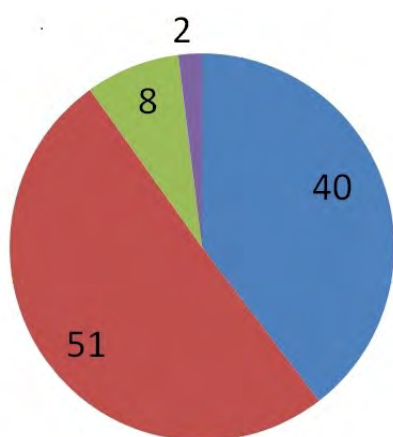
- **Researchers:** hear and discuss major new IPT work.
- **Industrial users:** steer research and learn of new developments.

More than 100 submitted papers range across our selected themes and topics. All papers include their relevant industry Sector(s), or General where their concepts can be applied widely.

The following Word Cloud illustrates terms with the letter size indicating the frequency of occurrence of each term.



The papers split across Congress Themes is illustrated in the pie chart..



A) New Generation Systems for Wider Support of Industrial Applications

B) New Developments in Foundational System Elements for Enhanced Process Interaction

C) Pioneering Industrial Case Studies

D) Future actions and events

Latest Information on **Registration, Travel and Tourism**, the **Congress Venue** and the detailed **Programme** is now available on the Congress website at: www.isipt.org/wcipt9.

An overview of paper topics - in above Theme and expanded Topic orders is provided below - see the variety and depth of new innovation to be presented at the Congress..

Theme A) New Generation Systems for Wider Support of Industrial Applications

Topic A1 - Multi-modal and multi-spectral methods addressing complex process distributions

Capacitively Coupled Impedance Imaging Based on Wideband Phase Measurement

Inclusion Boundary Reconstruction Using Electrical Impedance and Ultrasound Reflection Dual-Modality Tomography

Experimental Study of Complex-valued ECT

Chemical species tomography from spectral optical attenuation data

Comparison of different radial basis functions for parametric level set based method in electrical impedance tomography

Customization of the Spatial Resolution in Chemical Species Tomography
Liquid Distribution Fraction Measurement in Counter Current Flow Packed Column by Electrical Capacitance Tomography
Development of tomography techniques using a compact fast neutron generator
Non-invasive multimodal monitoring of transport and storage containers for spent fuel
Monitoring of the drying process using EIT method
TDLAS and ECT fused Tomography System for Flame Monitoring

Topic A2 - Multi-dimensional systems that radically extend length and/or temporal scales

Advanced correction algorithms for ultrafast X-ray computed tomography
High Energy Fast X-ray Tomography

Topic A3 - Smart tomographic systems that provide direct application data, or process control

Void Fraction of Gas-liquid Two-phase Flow by Capacitively Coupled ERT Sensor under Different Excitation Patterns
Electromagnetic Flow Tomography for Imaging Asymmetric Single and Multiphase Flows
Flow Loop Validation of Moving Electrical Tomography Sensor for Pipeline Inspection
Investigation of up/downstream flow a swirling inline fluid separator; using wire-mesh sensor and CFD studies
Long Short-Term Memory Neural Networks for Flow Regime Identification using ECT
Electrical Resistance Rheometry – multi-scale tomography sensors to provide in-pipe rheology in complex processes
A New Industrial Tomography System Combining Simultaneously the Emission and Transmission Tomography Systems
Two-Phase Flow in 3D CAD Pilot Unit Simulation and Gamma Ray Tomography Validation
Nondestructive Analysis of Soil Physical Properties by Combining X – Ray and Gamma – Ray CT Methodology
4D Scanning for Planar Array ECT
Dynamic Imaging Based Structure Tracking with Ultrafast X-Ray Tomography
Effects of Riser Cross Section Aspect Ratio on the Flow Dynamics in Circulating Fluidised Beds
Gas-solids Flow Measurement in Cyclone Dipleg by Dual-plane Electrical Capacitance Tomography Sensor
Magnetic Induction Tomography for imaging defects and deformations of external surfaces
Identification and Digital Control Design for a Pilot FCC Type Unit using Gamma Transmission Measurements
Application of Electrical Impedance Tomography for Monitoring Flood Embankments and Landfills
Multimodal System for Data Analysis and Image Reconstruction in Process Tomography
Gamma Computed Tomography Performance for Petrophysical Characterization of Sandstone Rocks

Topic A4 - Human-machine interaction in IPT systems

Investigating X-Ray Images For Studying Gravitational Flow In Silos Using Crowdsourcing Annotations And Analysis
Interactive System for Spatial and Temporal ECT Data Investigation

Topic A5 - Machine learning from IPT data

Estimation of Porous Material Parameters Using Ultrasound Tomography and Deep Learning
Flow Regime Identification with Single Plane ECT Using Deep Learning
Application of Electrical Tomography for Spatial Analysis of Damp Walls Using Statistical Methods
Machine Learning and Algebraic Reconstruction Methods for Gamma-ray Spectral Analysis
Deep Learning with Classical Image Reconstruction Algorithms for Electromagnetic Tomography
EIT Velocity Field Estimation via Pixel-to-Pixel Least-Squares Matching
Deep Learning Based Image Reconstruction for Electrical Capacitance Tomography

Theme B - New Developments in Foundational System Elements for Enhanced Process Interaction

Topic B1 - Excitation and response sensing methods and topologies for all modes: e.g. acoustic, electrical, hard radiation, magnetic resonance, and positron-emission

Temperature Field Reconstruction based on Acoustic Travel-time Tomography
Image Reconstruction of Capacitively Coupled ERT using Total Impedance: Sensitivity Distributions
Improving Concealed Metallic Object Characterization using Polarizability Tensors
Characterisation of the Effects of Sensor Geometry on the Performance of Magnetic Induction Tomography Systems
Detection of Bubbles in Cryogenic Liquids using Electrical Capacitance Tomography
Performance Investigation of an Electromagnetic Flow Tomography System
An Electrical Impedance Tomography Sensor for Dynamic Two-Phase Flow Instrumentation
Detection of Steel Strand Cross Section Distribution in Post-Tensioned Pre-stressed Ducts Based on Simulation Studies

Image Reconstruction for Visualization of Cell Living Rate in Microchannel and multi-layer Electrodes
Front End Instrumentation Modelling of Electrical Tomography Systems
A Fast Optical Tomography System Based on a Two-axis Scanning Mirror
Transient Modelling of Wire-Mesh Sensor
Numerical Aspects of Contactless Inductive Flow Tomography for Crystal Growth
The Design of Electrical Impedance Tomography Detectors in Nuclear Industry
Simultaneous and Continuous Excitation Strategy for High-speed EIT: the ONE-SHOT method
Analysis of Displacement Imaging Associated with Acoustic Radiation Force Impulse
Ultrasound Tomography of Attenuation in Heterogeneous Medium using Continuous-wave Excitation

Topic B2 - Data acquisition architectures to enhance system performance for focused IPT products

Optimized Stimulation Patterns for Miniature Electrical Impedance Tomography with Planar Electrodes Array
Structure Optimization of Cambered Magnetic Induction Tomography
Direct Capacitance Measurement for Tomographic Imaging of Metallic Object
Analog-Signal Quality Characterization of the FLITES Distributed 192-Channel Data Acquisition System
Simulation of Flame Temperature Reconstruction through Multi-Plenoptic Camera Techniques
Impedance Matched Front-End Circuitry for Electrical Capacitance Tomography Systems
Evaluation of Measurements with the EVT4 Electrical Capacitance Tomography System Using 3D Sensor
Comparison of 2D and 3D Sampling in Electrical Capacitance Tomography
3D-printed Multilayer Sensor Structure for Electrical Capacitance Tomography
Preliminary Study of Dynamic Computed Tomography Based on Distributed X-ray Source
FPGA Implementation of LMS and NLMS Adaptive filters for Electrical Impedance Tomography System
Low Cost Design of Electrical Impedance Tomography Hardware System for Industrial Application

Topic B3 - Integrated system design and packaging for special application needs

Tomography to Visualize Nanoparticle- Assisted Multiphase Flow in Porous Media

Topic B4 - Raw data processing, direct inversion and high-speed reconstruction methods

Improved Backscatter Correction Model for High Attenuation Gamma-ray Tomography Measurements
A Fast Iterative Adaptive Thresholding Algorithm for Electrical Resistance Tomography
Influence of the Integral Parameters in Calderon Method on Image Quality for Electrical Capacitance Tomography
Fast 3-D Electrical Impedance Spectroscopic Imaging Using Extended Joint Sparsity
Compensation for Unknown Contact Impedance Variance using Electrical Impedance Spectro-Tomography
Real-time Dynamic Jacobian for Deformable Electrode in Wearable EIT using Cloud Computing Technology
Volume Fraction Estimation in Pneumatic Conveying from Tomographic Measurements
Feature Estimation in Electrical Impedance Tomography using Boundary Element Method and Exact Derivatives
Ultrasonic Tomography for Automated Material Inspection in Liquid Masses
Correction of Phase Errors due to Leakage Currents in Wideband EIT Field Measurements on Soil and Sediments
Influence of Primary Hepatocellular Carcinoma Size and Stage on Echo Signal in Human Abdomen
Subsurface Resistivity Imaging with Nonlinear Differential Approach using Electrical Resistance Tomography
Cuckoo Search Optimization Algorithm for Boundary Estimation Problems in Electrical Impedance Tomography

Topic B5 - Interpretation data processing yielding industry relevant information

Liquid Mixing Time and Solid Dissolution in Slurry Stirred Tanks
Thresholding and Fuzzy Logic Fusion in Visualisation of Gas-Oil-Water Flow using Dual-Modality Electrical Tomography
Time-lapse X-ray Tomography and Data Processing Study of Organic Granular Material Behaviour during Mass Flow in Silo
Towards ECT Coupled with CMOS Vision Sensing Qualitative Analysis of Bulk Solid Flow Concentration and Velocity Profiles
Imaging of a Distinctive Large Bubble in Gas-water Horizontal Flow Based on Size Projection Algorithm
Investigation of Venturi Constriction Characteristics in Multiphase Flow using High Speed Gamma-Ray Tomography
Wire-mesh Sensor Applied for the Visualisation of Gas-Liquid-Solid Flows with Hydrate-like Particles
Comparison of ERT Reconstruction Algorithms to Monitor the Bed in Settling Slurry Pipe Flow

Theme C Pioneering Industrial Case Studies

Comparison of Different Tomography Method Measurements on Clay Based Slurry Pipeline Systems
Investigation of the Dielectric Properties of Lithium-ion Battery Slurry by Electrical Impedance Spectra-tomography Method
Evaluation of Hold-up in Rotating Packed Bed for Separation using Synchronized Gamma-Ray Computed Tomography
Contactless Inductive Flow Tomography for Models of Continuous Casting and Crystal Growth
Electrical Capacitance Tomography for Condition Monitoring During the Regeneration of Reclaimed Foundry Sand
Industrial Applications of High-speed Electrical Capacitance Tomography
Investigation of the Gas-Liquid Flow Inside a Cyclonic Flow Distribution System using Wire-Mesh Sensors
Bubble Mapping Method for Transient Taylor Bubble Flows

Theme F - Past and Future Plans and Events

FS-17-1: Sandpit Workshop Report - Real-time State and Performance from IPT Data for Process Control
TOMOCON: A Marie Skłodowska-Curie European Training Network on Tomography-based Control in Industrial Processes
Presentation of the 10th World Congress in IPT WC-IPT-10 in Tianjin China 2020.

WORLD CONGRESS WC-IPT-10, SEPTEMBER 2020

Our next planned World Congress event will be held in the City of Tianjin, China in 2020. Tianjin has fast connections from Beijing International airport and therefore offers convenient travel. It also provides an opportunity for wider travel to see some of the most interesting tourist locations in China. Tianjin University has a long and impressive background in IPT development. We are grateful to Prof. Feng Dong and his team for their generous offer to hold WC-IPT-10 at Tianjin. Further details will be available soon on the ISIPT website. We hope to hear an overview of the Event at WC-IPT-9.

ARE YOU IN OUR WC-IPT-11 2022 WORLD?



As a global organisation we aim to hold our major meetings around the planet. Our next World Congress will take place in Bath, UK in 2018. Our next planned event is in China in 2020. The following event could re-visit the American continent in 2022 within the Longitude sector 60°W to 180°W including **Canada, USA, Mexico, Central states and all South American states.**

We invite all members within this sector to consider mounting our World Congress-11 in 2022..

Our World Congress events clearly require considerable organisation. Major support is available from the ISIPT; see: www.isipt.org/events and use the **Propose an Event** link. An overview with a downloadable Guide-note provides a brief template of questions for direct use in a proposal. To propose mounting a WC please simply submit an Outline Proposal which provides a short response to each guide-note question, plus a few images of the venue, the city and area, etc.

For the selected proposal further support is then available to assist with financial planning and general logistics. The ISIPT will also provide a specific publicity website (linked to our main website) ISBN registration for proceedings and later uploading of papers to our Open-Access publications library. A planning spreadsheet is available to highlight main costs and predict 'break-even' numbers needed. Please submit any questions and Outline Proposals to: events@isipt.org.

FUTURE FOCUSED SYMPOSIUM EVENTS

Future Focussed Symposium Events

The first Focussed Symposium had 18 attendees and was both enjoyable and productive. A Report Paper will be presented at WC-IPT-9. The Event was followed by a major consortium on the same theme which has about 15 early stage researchers working across Europe.

ISIPT has resolved to support an unlimited number of Focussed Symposium Events - designed to explore narrow topics in depth in a wide variety of formats. Importantly these events are designed to avoid internal competition with our biennial World Congress events.

Could you offer a Focussed Symposium event? This may explore a new idea in depth and attract collaborators. Or offer an opportunity for a specific group to share a theme of interest: such as creating a new network; or planning research programmes for regional postgraduate students.

Our Focussed Symposium events are intended to be relatively informal and simple to organise. Support on organising Events in general is available from the ISIPT website at www.isipt.org/events. Use the **Propose an Event** link, where an overview is provided, plus a downloadable Guide-note that provides a brief template of questions for direct use in a proposal. A simple planning spreadsheet can also then be supplied to highlight the main costs and predict 'break-even' numbers needed. Please forward questions or proposals to: events@isipt.org.

PUBLICATIONS NEWS

Full Open Access to all papers for all 8 previous World Congress WC-IPT-1..8 is available to all members when logged in at: www.isipt.org/publications. Proceedings for WC-IPT-9 will be compiled and added some time after World Congress-9.

INDUSTRY CASE STUDIES

Our Society is concerned with Industrial Process Tomography. Of course we are interested in research, but this must commonly lead to exploitation and application. As requested in previous Newsletters we would like to feature contrasting examples where IPT is in ongoing continuous use in an industry application. We have received a small number of Case Studies mounted on the website under the *NEW Applications* tab. We would like to feature a wide range of representative Case Studies so we would be grateful for more.

If you are linked with an industrial application please consider submitting an IPT **Industry Case Study** for this new section. Confidentiality issues can arise of course, but often these can be addressed by editing sensitive details. Sharing solutions is beneficial for all in stimulating new applications. A **Case Study** need only be brief: an outline of the type of the target process in general terms; the IPT equipment/method in use; the general information and benefits it delivers to the application, plus one or two illustrative images. It's important to note that we are interested in actual applications in industry (not in experimental equipment in the research lab'). We will create a web draft from your submission and refer this to you for final approval. Please submit your case study (or any questions) to: industry@isipt.org.

DEVELOPMENT OF OUR GLOBAL COMMUNITY

We currently have more than 550 members from 55 states.

The ISIPT can only effectively deliver its aims if it extends coverage to everyone who has an interest, as a researcher, developer, a user or simply for people interested in how science and technology is applied. Please pass on information about ISIPT to your colleagues and contacts to grow our community.

We are all affected by 'succession planning'; please help the ISIPT to continuously renew our community by encouraging junior colleagues to become members - so that they can benefit and *'stand on our shoulders'*.

Acknowledgements: Thanks to Philip Ronson of Aggelia for his work on our website and electronic communications.

ISIPT Executive Team - August 2018