1st IFAC Workshop on Control of Systems Governed by Partial Differential Equations

(CPDE 2013)

Paris, France
25-27 September 2013

Editors:

Yann Le Gorrec

### WeMPAH

**Controllability of PDEs and Nonlinearity: Methods, Results and Open Problems (Plenary Session)**

Chair: Zuazua, Enrique  
Basque Center for Applied Mathematics

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<td>09:00-10:00</td>
<td>WeMPAH.1</td>
<td>Amphi Hermite</td>
<td>Coron, Jean-michel</td>
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**Controllability of Partial Differential Equations and Nonlinearity: Methods, Results and Open Problems**.

### WeMAH

**Controllability and Observability (Regular Session)**

Chair: Rudolph, Joachim  
Co-Chair: Chambrion, Thomas  
Saarland Univ., Univ. de Lorraine

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<td>10:20-10:40</td>
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<td>Amphi Hermite</td>
<td>Moment Methods and Systemswith Infinite Memory: An Overview, pp. 1-6. Attachment</td>
<td>Pandolfi, Luciano</td>
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| 10:40-11:00 | WeMAH.2 | | Null Controllability of the 1D Heat Equation Usina Flatness, pp. 7-12. Attachment | Martin, Philippe  
Rosier, Lionel  
Rouchon, Pierre | Mines ParisTech, Univ. de Lorraine, Mines-ParisTech |
| 11:00-11:20 | WeMAH.3 | | Controllability and Prediction-Free Control of Coupled Transport Processes Viewed As Linear Systems with Distributed Delays, pp. 13-18. Attachment | Gehring, Nicole  
Rudolph, Joachim  
Woittennek, Frank | Saarland Univ., Saarland Univ., Tech. Univ. Dresden |
Micu, Sorin  
Roventa, Ionel  
Tucsnak, M. | Univ. Blaise Pascal Clermont-Ferrand, Univ. of Craiova, Univ. of Craiova, Univ. of Lorraine |
| 11:40-12:00 | WeMAH.5 | | Observers and Regional Observability of Semilinear Beam Equations* | Fridman, Emilia  
Terushkin, Maria | Tel-Aviv Univ.  
Tel Aviv Univ. |
| 12:00-12:20 | WeMAH.6 | | Energy Estimates for Low Regularity Bilinear Schrödinger Equations, pp. 25-30. Attachment | Caponigro, Marco  
Chambion, Thomas  
Boussaïd, Nabile | Conservatoire National des Arts et Métiers, Univ. de Lorraine, Lab. de Mathématiques, Univ. de Franche-Comté |

### WeMAD

**Feedback and Tracking Control (Regular Session)**

Chair: Woittennek, Frank  
Co-Chair: Aksikas, Ilyasse  
Tech. Univ. Dresden, Qatar Univ.

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| 10:20-10:40 | WeMAD.1 | Amphi Darboux | Semi-Numerical Trajectory Planning for Coupled Systems of Linear Diffusion-Convection-Reaction Equations, pp. 31-36. Attachment | Schmidt, Jakob  
Meurer, Thomas | Vienna Univ. of Tech., Christian-Albrechts-Univ. Kiel |
<p>| 10:40-11:00 | WeMAD.2 | | Flatness Based Feedback Design for Hyperbolic Distributed Parameter Systems with Spatially Varying Coefficients, pp. 37-42. Attachment | Woittennek, Frank | Tech. Univ. Dresden |</p>
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<td>Robust Measurement Feedback Control of an Inclined Cable, pp. 55-60. Attachment</td>
<td>Baudouin, Lucie, Neild, Simon Andrew, Rondepierre, Aude, Wagg, David James, LAAS-CNRS, Univ. of Bristol, INSA de Toulouse</td>
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<td>WeMAD.6</td>
<td>Stability Criteria for Non-Linear Time-Varying PDEs*</td>
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**WeAPAH**

PDE Control Designs Inspired by Problems in Off-Shore Drilling and Oil Production (Plenary Session)

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**WeAAH**

Control of Partial and Delay Differential Equations (Invited Session)

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<td>Demetriou, Michael A., Fahroo, Fariba, Worcester Pol. Inst., Naval Postgraduate School</td>
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<td>16:20-16:40</td>
<td>WeAAH.4</td>
<td>Control of PDE Systems with Delays (I), pp. 79-84. Attachment</td>
<td>Burns, John A, Zietsman, Lizette, Virginia Tech.</td>
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17:00-17:20 WeAAH.6
Fuertinger, Doris Helene
Kappel, Franz
Renal Res. Inst. New York
Univ. of Graz

WeAAD
Sparse Solutions in Optimal Control of Partial Differential Equations (Invited Session)

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<td>Control and Stabilization of the Schögel Model (I)*.</td>
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<td>Tech. Univ. Berlin</td>
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<td>Ryll, Christopher</td>
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<td>Various Ways to Get Sparsity in Control Problems of Parabolic Equations (I)*.</td>
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<td>Casas, Eduardo</td>
<td>Univ. of Cantabria</td>
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<td>Herzog, Roland</td>
<td>Department of Mathematics, Chemnitz Univ. of Tech.</td>
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<td>Wachsmuth, Gerd</td>
<td>Department of Mathematics, Chemnitz Univ. of Tech.</td>
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<tr>
<td>Sparse Optimal Control of Some Reaction-Diffusion Equations (I)*.</td>
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<td>Casas, Eduardo</td>
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<td>Sparse Controls for Elliptic and Parabolic Partial Differential Equations (I)*.</td>
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<td>Kunisch, Karl</td>
<td>Univ. Graz</td>
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Technical Program for Thursday September 26, 2013

### ThMPAH
#### Well-Posedness of Port-Hamiltonian Systems (Plenary Session)
- **Chair:** Le Gorrec, Yann
- **Time:** 09:00-10:00

**Well-Posedness of Port-Hamiltonian Systems**
- **Speaker:** Zwart, Hans
- **Institution:** Univ. of Twente

### ThMAH
#### Port Hamiltonian Modeling and Control of Distributed Parameter Systems (Invited Session)
- **Chair:** Le Gorrec, Yann
- **Co-Chair:** Maschke, Bernhard
- **Organizer:** Le Gorrec, Yann
- **Organizer:** Maschke, Bernhard
- **Time:** 10:20-10:40

**Dirac Structures on Hilbert Spaces and Boundary Control of Distributed Port-Hamiltonian Systems (I),** pp. 97-102.
- **Speaker:** Macchelli, Alessandro
  - **Institution:** Univ. of Bologna - Italy

**Boundary Port Variables and Uniform Controllability: The Shallow Water Example (I),** pp. 103-108.
- **Speakers:** Anda Ondo, Diemer; Lefevre, Laurent; Chopard, Bastien
  - **Institutions:** Grenoble-INP, LCIS; Grenoble INP; CUI, Univ. of Geneva

**Reaction-Diffusion Systems As Complex Networks (I)**
- **Speakers:** Seslija, Marko; Scherpen, Jacqueline M.A.; van der Schaft, Arjan J.
  - **Institutions:** Katholieke Univ. Leuven; Univ. of Groningen; Univ. of Groningen

**On Alternative Poisson Brackets for Fluid Dynamical Systems and Their Extension to Stokes-Dirac Structures (I),** pp. 109-114.
- **Speakers:** Weiss, George
  - **Institutions:** Tel Aviv Univ.; Katholieke Univ. Leuven; Univ. of Groningen

### ThMAD
#### Model Predictive Control for PDEs (Invited Session)
- **Chair:** Gruene, Lars
- **Co-Chair:** Hinze, Michael
- **Organizer:** Gruene, Lars
- **Time:** 10:20-10:40

**Model Predictive Control and Moving Horizon Estimation of a Large-Scale Chemical Reactor Model (I),** pp. 121-126.
- **Speakers:** Rhein, Sonke; Utz, Tilman; Graichen, Knut
  - **Institutions:** Univ. of Ulm; Unihmburg; Univ. of Ulm

- **Speaker:** Hinze, Michael
  - **Institution:** Univ. of Hamburg
15:40-16:00  ThAAD.2
Attachment
Zerrougui, Mohamed
Boulkroune, Boulaid
Kinnaert, Michel

16:00-16:20  ThAAD.3
Spatial Effect of Noises in Electrodeposition Process Control, pp. 185-190. Attachment
Tenno, Robert

16:20-16:40  ThAAD.4
Modelling and Control of Extruder Barrel Temperature Field, pp. 191-196. Attachment
Lipár, Slavomir
Noga, Pavol
Hulko, Gabriel

16:40-17:00  ThAAD.5
Phenomenological Approach to Model a Clinker Rotary Kiln, pp. 197-202. Attachment
N'zi, Yoboué Guillaume
Tarasiewicz, Stanislaw

17:00-17:20  ThAAD.6
Robust State Estimation for a Class of Convection-Diffusion-Reaction Systems, pp. 203-208. Attachment
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Pham, Van Thang
Georges, Didier
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<td><strong>PDE Applications (Invited Session)</strong></td>
<td>Amphi Hermite</td>
<td>Chair: Dos Santos Martins, Valérie Sylvie</td>
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<td><strong>Reduced-Order Modelling in PDE Constrained Optimization (Invited Session)</strong></td>
<td>Amphi Darboux</td>
<td>Co-Chair: Iapichino, Laura</td>
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Mechhoud, Sarah, Univ. de Grenoble, Gipsa-Lab, Grenoble. Witrant, Emmanuel, Univ. Joseph Fourier, Grenoble Dugard, Luc, Gipsa-Lab, CNRS Grenoble Moreau, Didier, CEA

Dos Santos Martins, Valérie Sylvie, Univ. Claude Bernard Lyon 1

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Tang, Ying, Grenoble Univ. Phier, Christophe, CNRS Girard, Antoine, Univ. Joseph Fourier

**Boundary Control Systems with Yosida Type Approximate Boundary Observation**, pp. 233-238. Attachment
Dehaye, Jérémy R., Univ. of Namur (FUND) Winkin, Joseph J., Univ. of Namur (FUND)

**Finite-Time Stabilization of Hyperbolic Systems Over a Bounded Interval**, pp. 239-244. Attachment
Perrollaz, Vincent, Lab. de Mathematiques et Physique Theorique, Univ. d Rosier, Lionel, Univ. de Lorraine

Alessandro, Alla, Sapienza, Univ. di Roma Falcone, Maurizio, SAPIENZA - Univ. di Roma

**Computational Reduction for Parametrized PDE-Constrained Optimization Problems Arising in Haemodynamics**.* Rozza, Gianluigi, SISSA Nogri, Federico, EPFL Manzoni, Andrea, SISSA
Error Control Based Model Reduction for Parameter Optimization of Elliptic Homogenization Problems (I), pp. 251-256. Attachment
Ohlberger, Mario
Schaefler, Michael
Univ. of Muenster
Univ. of Muenster
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Balancing-Related Model Reduction for Parabolic Control Systems (I), pp. 257-262. Attachment
Benner, Peter
Max Planck Inst. for Dynamics of Complex Tech. Systems
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A-Posteriori Error Estimation for Parameter Optimization with Reduced Basis Surrogate Models (I)*.
Haasdonk, Bernard
Dihlmann, Markus
Univ. of Stuttgart
Univ. of Stuttgart
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Optimization Strategy for the Parameters Sampling in the Reduced Basis Method*.
Iapichino, Laura
Volkwein, Stefan
Univ. of Konstanz
Univ. of Konstanz

FrAAH
Error Analysis in Optimal Control of Partial Differential Equations (Invited Session)
Chair: Casas, Eduardo
Co-Chair: Tröltzsch, Fredi
Organizer: Casas, Eduardo
Organizer: Tröltzsch, Fredi
Univ. of Cantabria
Tech. Univ. Berlin
Univ. of Cantabria
Tech. Univ. Berlin
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Improved Error Estimates for the Discretization of State Constrained Control Problems (I)*.
Casas, Eduardo
Mateos, Mariano
Vexler, Boris
Univ. of Cantabria
Univ. of Oviedo
Tech. Univ. München
14:20-14:40 FrAAH.2
Discontinuous Galerkin Time-Stepping Schemes for Robin Boundary Control Problems Constrained to Parabolic PDE's (I)*.
Chrysaflinos, Konstantinos
Karatzas, Efthimios
National Tech. Univ. of Athens
Department of Mathematics, National Tech. Univ. of Ath
14:40-15:00 FrAAH.3
Neitzel, Ira
Pfefferer, Johannes
Rüsch, Arnd
Tech. Univ. Muenchen
Univ. der Bundeswehr Muenchen
Univ. of Duisburg-Essen
15:00-15:20 FrAAH.4
Numerical Approximation of Optimal Control Problems of a Class of Quasilinear Equations with Gradient Coefficients (I)*.
De los Reyes, Juan Carlos

FrAAD
Modelling and Control of Collective Dynamics (Invited Session)
Chair: Caponigro, Marco
Co-Chair: Maury, Bertrand, Antti
Organizer: Caponigro, Marco
Organizer: Piccoli, Benedetto
Organizer: Ghezzi, Roberta
Conservatoire National des Arts et Metiers
Lab. de Mathematiques, Univ. Paris Sud
Conservatoire National des Arts et Metiers
Scuola Normale Superiore, Pisa
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Muntean, Adrian
van de Ven, Fons
Eindhoven Univ. of Tech.
Eindhoven Univ. of Tech.
Eindhoven Univ. of Tech.
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Kinetic Description and Asymptotics for Bacterial Chemotaxis (I), pp. 269-274. Attachment
Vauchelet Nicolas, Vauchelet
UPMC Paris 06
14:40-15:00 FrAAD.3
Handling Congestion in Crowd Motion Modeling: Micro versus Macro (I)*.
Optimal Location of a Mobile Sensor Continuum for Environmental Monitoring, pp. 275-280. Attachment

Georges, Didier

Grenoble Inst. of Tech. - ENSE3