CERMICS

SOMMAIRE

CERMICS

Laboratory of applied mathematics and scientific computing
(*Centre d'Enseignement et de Recherche en Mathématiques et Calcul Scientifique)*

UNIVERSITÉ PARIS-EST

École des Ponts ParisTech laboratory hosting joint project-teams with INRIA

CERMICS
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Director: Jean-François Delmas
Vice-Director: Alexandre Ern

STAFF

16 Researchers
10 Associate researchers
14 External collaborators
32 PhD students
8 Starting PhD students
3 Administrative assistants
8 Post-docs
6 Invited researchers
12 Internship students

QUALITATIVE RESULTS

CERMICS is a laboratory of École des Ponts ParisTech, hosting joint research teams with INRIA and University Paris-Est of Marne-la-Vallée (UPEMLV). It is located at École des Ponts ParisTech in Champs-sur-Marne. The scientific activity of CERMICS covers several domains in scientific computing, applied probability, modelling, and optimization. It has been evaluated A+ in 2008 by the AERES. Since 2011, the three laboratories: CERMICS, LAMA (mathematic department of UPEMLV and University Paris-Est of Créteil (UPEC)) and LIGM (informatic department of UPEMLV, ENPC and ESIEE), constitute the LabEx Bézout from the French "Programme d'Investissements d'Avenir". This LabEx is focused on the extremely active area at the interface between mathematics and computer sciences. Since 2012, they also constitute the CNRS Federation Bézout.

In 2012, the four laboratories CERMICS, ICMPE (chemestry and materials departement of UPEC), MSME (Multi-scale modelling and simulation of UPEMLV and UPEC) and Navier (ENPC and IFSTTAR) constitute the LabEx MMCD (Multi-Scale Modelling & Experimentation of Materials for Sustainable Construction) from the French "Programme d'Investissement d'Avenir". This LabEx aims at developing an advanced research on engineering and environmental materials, relying on approaches involving the top research means for the modelling, numerical simulations, experimentation and imaging, in mechanics and physico-chemistry.

Concerning Cermics organization, three teams deal with modelling and scientific computing: the "Fluid Dynamics" team (leader: Alexandre Ern), which develops advanced numerical methods (finite elements, a posteriori error estimates, uncertainty propagation) applied to environmental flows and fluid/solid interaction, the "Molecular and Multiscale Simulations" team (leader: Tony Lelièvre), which covers several connected fields such as electronic structure calculations, numerical statistical physics, multiscale simulation of materials, etc., and the "PDE and Materials" team (leader: Régis Monneau) devoted to the mathematical modelling of material behavior at the crystalline level. Two other teams cover several important domains of applied mathematics: the "Optimization and

Systems" team (leader: Michel De Lara) involved in research about optimization (mostly in a stochastic setting and operation research) and its applications (energy, transport, biodiversity), system simulation, control and operation research, and the "Applied Probability" team (leader: Benjamin Jourdain) with applications of probability theory to modelling and numerical methods. All teams have their own research domains, and collaborate on specific topics, like, for example, Quantum Monte Carlo methods for the computation of the ground state energy of a Schrödinger Hamiltonian or domain decomposition and uncertainty propagation. It can be pointed out that two teams are joint project-teams with INRIA: the "Molecular and Multiscale Simulations" team hosts the INRIA Rocquencourt project-team MICMAC (leader: Claude Le Bris), and the "Applied Probability" team takes part to the UPEMLV-INRIA Rocquencourt project-team MathRisk (leader: Agnès Sulem), which has replaced the project-team MathFi.

KEY FACTS

Staff changes, missions, visits

Mathias Rousset joined CERMICS as an INRIA researcher on September 1st, 2012. In June 2006, Mathias Rousset completed his PhD in applied probability at Université Paul Sabatier, Toulouse, under the supervision of P. Del Moral and L. Miclo. After having spent 4 years and a half in the SIMPAF project-team of Inria Lille - Nord Europe, he moved to the MICMAC project-team located at CERMICS. His research focus on computational physics (molecular simulation, fluid mechanics, micro/macro modeling) with emphasis on the mathematical perspective and the use of probabilistic tools.

Laurent Monasse joined the fluid dynamics team as a researcher since September 1st, 2012. He completed his PhD at CERMICS under the supervision of Serge Piperno and defended it in October 2011. He then did a post-doc at Stanford University with Charbel Farhat. His scientific activities concentrate on the numerical study of models for fluid and solid mechanics and fluid-structure interaction.

T. Lelièvre is an Ordway visiting professor at the University of Minnesota for the academic year 2012-2013.

A. Ern delivered the Von Neumann Lecture at the HGS MathComp (Heidelberg Graduate School of Mathematical and Computational Methods for the Sciences), June 2012.

C. Le Bris has held a position of Visiting Professor at the University of Chicago, October-November 2012.

R. Monneau was invited for three months at the Lebanese University, February to April, 2012.

A. Ern delivered one of the Opening Lectures at Ecole des Ponts Paris Tech on underground radioactive waste storage.

E. Cancès has been invited by the Chinese Academy of Sciences, Beijing, China, April 2012 and at IPAM-UCLA, Los Angeles, USA, October 2012.

Publications and prizes

The CERMICS laboratory has sustained a very high scientific activity: three books, more than sixty articles in international refereed journals and five chapters of books have been published. Also about one hundred and forty presentations in conferences or seminar have been made and ten conferences or workshops have been organized by members of CERMICS.

D. Chemla received the junior researcher prize from ROADEF 2012.

The book "From general mechanics to discontinuity : unified approach to elasticity", (French) by C. Mariotti and L. Monasse was published by Presses des Ponts in November 2011
(ISBN-13: 978-2859784607).

The book on "Mathematical Aspects of Discontinuous Galerkin Methods" by D. Di Pietro and A. Ern was published by Springer in 2012
(ISBN-13: 978-3642229794).

The book "Introduction to probability and statistic, exercises and problems with corrections" (French) by J.-F Delmas has been published by Presse de l'ENSTA in 2012
(ISBN-13: 978-2722509375).

Industrial impact

The activities of industrial transfer in the laboratory are strongly linked to research activities. Scientific results are mostly obtained in collaboration with Research and Development Departments of large industrial firms through research contracts (ANDRA, BRGM, CEA, Creditnext, EADS, EDF, Société Générale, US Air Force, US Navy, etc). Seven programs, which represent 20 % of our financial support, are granted by the «Agence Nationale de la Recherche» (ANR). The level of research contracts was very high in 2012, about 640 k€ for contracts signed by École des Ponts ParisTech.

The chair "Measure of Financial Risks" as been renewed with Société Générale, Ecole Polytechnique and, as a new partener, University Pierre and Marie Curie (UPMC) Paris VI.

Teaching

The members of CERMICS are strongly involved in teaching at École des Ponts ParisTech, École Polytechnique, École des Mines, ENSTA and in Masters in collaboration with Universities. Among them, École des Ponts Paristech has a strong partnership with the 2nd year Master program on Applied Mathematics and Mathematical Finance of UPEMLV, and the 2nd year Master program on Numerical Analysis, PDES and on optimization and games theory of UPMC.

RESEARCH TEAMS

1.Applied probability

2.Fluid dynamics

3.Molecular and multiscale simulations

4.Optimization and systems

5.PDE and materials

1. Applied probability

The team is mainly interested in the study of probabilistic numerical algorithms with applications going from mathematical finance to biology, quantum chemistry and molecular simulation. The other important research field is the probabilistic interpretation of PDEs, especially nonlinear ones.

In july 2012, the chair "Measure of Financial Risks" of the Risk Fundation has been renewed for a five year period with the arrival of the UPMC as a new partner in addition to École des Ponts, École Polytechnique and Société Générale. At the end of 2012, the INRIA project team Mathrisk, involving Ecole des Ponts and Université Paris-Est Marne-La-Vallée, has been created to replace the Mathfi project team. During the preparation of the renewal of these two programs which structure the research in finance, the modeling of systemic and liquidity risks has emerged as a new priority to address the issues raised by the 2008 financial crisis.

The Eurostars (OSEO) project which has financed two postdocs in the team, one on Private Public Partnerships one on dependence modelling in finance, ended in December2012.

The ANR program BigMC started in 2009 permits collaborations with the statisticians from the ENST and the University Paris Dauphine to enhance Monte Carlo methods especially with adaptive variance reduction techniques. It financed the postdoc of B. Miasojedow who obtained new results on the scaling of Metropolis Hastings algorithms with respect to the dimension of the target probability distribution together with B. Jourdain and T. Lelièvre.

The team hosts the ANR program A3 on Random Trees and Applications (in collaboration with Universities of Orléans, Bordeaux and Nancy) which focuses on branching processes and random maps. The team, in collaboration with R. Abraham (Univ. Orléans) organized the international workshop of this program (32 talks, 45 participants), which was held at Marseilles (CIRM) in September. Olivier Hénard and Patrick Hoscheit have defended their PhDs in this domain. Zenghu Li, professor at Beijing Normal University, came for a one month visit in september together with his PhD student Hongwei Bi who will stay until september 2013, to work on models for genetic populations with advantageous mutations.

In 2012, Aurélien Alfonsi has defended his HdR. Two students, Pierre Blanc and Clement Rey, have started PhDs under his supervision.

2. Fluid dynamics

The Fluid Dynamics team develops advanced numerical methods for environmental flows and fluid/solid interaction. The main applications are underground waste storage, interaction of shock waves with solids, runoff and erosion in hydrosystems, thin gravitational flows, and acoustics. Scientific activities are concerned with modelling, numerical analysis, and simulation. The developed numerical methods include discontinuous Galerkin, a posteriori error estimates, and finite volumes. Uncertainty propagation and quantification is an important topic, in particular handled within stochastic Galerkin methods. Most activities are developed in partnership with industry and involve a PhD thesis. Three theses were defended in 2012, one on fluid modeling at the nanometric scale by R. Joubaud, one on uncertainty in infiltration and erosion processes by M. Rousseau, and one on a posteriori error estimates for finite volume schemes by N. Chalhoub.

3. Molecular and multiscale simulations

The scientific focus of the team (which is also part of the INRIA project-team MicMac) is to analyze and improve the numerical schemes used in the simulation of materials at the microscopic level (computational chemistry, molecular dynamics), and in simulations coupling this microscopic scale with larger macroscopic scales (solid mechanics, fluid mechanics). The main domains of application

are: quantum chemistry, material science and molecular dynamics. Our work pursues a twofold goal: giving the models a sound mathematical grounding, and improving the numerical approaches.

More precisely, the main topics covered by the team are the following:
- computational quantum chemistry and approximation of the Schrödinger problem
- molecular dynamics and computational statistical physics
- free surface flow
- micro-macro models for fluids
- micro-macro models for solids and stochastic homogenization
- quantum models for electrochemistry.
Let us also mention an emerging activity on uncertainty propagation and applications of greedy algorithms.

Over the years, the team has accumulated an increasingly solid expertise on such topics, which are traditionally not well known by the community in applied mathematics and scientific computing. One of the major achievements of the team is to have created a corpus of literature, authoring books and research monographs on the subject that other scientists may consult in order to enter the field.

Among the main achievements in 2012, let us mention the following:
- Concerning electronic structure theory, the team addressed issues related to the modeling and simulation of local defects in periodic crystals, and in particular for time-dependent problem, and disordered quantum systems. On the numerical side, various results have been obtained concerning eigenvalue calculation problems, in particular for the computation of eigenvalues in spectral gaps of locally perturbed periodic Schrödinger operators. The team is also involved in specific developments for applications in electrochemisty and optoelectronics. In addition, a new activity on open quantum systems (Lindblad equation) emerged.
- Concerning molecular dynamics, new results have been obtained on efficient sampling algorithms, in particular concerning the sampling of trajectories and non-equilibrium systems. Among the results obtained this year, let us mention the analysis of the Wang-Landau algorithm, the study of non-reversible dynamics for improving the sampling and the adaptation of the parareal algorithm to Hamiltonian systems. We are continuously discussing the practical counterparts of these methodological and theoretical results with practitioners (chemists and molecular biologists).
- Various results have been obtained in the field of multiscale modelling for solid materials and for fluids. The activity for the team of stochastic homogenization for random materials is still growing. Many results have been obtained, in particular concerning efficient numerical strategies to compute effective properties of random materials.

In 2012, V. Ehrlacher and F. Thomines defended their PhD, respectively on some mathematical and numerical problems in quantum mechanics and uncertainty quantification, and on numerical methods for random materials. G. Stoltz defended his HdR on nonequilibrium and dynamical problems in molecular simulation.

4. Optimization and systems

The Optimization and systems team comprises three senior researchers and four associated researchers -- Pierre Carpentier (ENSTA), Laetitia Andrieu (EDF), Kengy Barty (EDF), Anes Dallagi (EDF).

* Numerical methods in stochastic control, risk management and probability constraints

These themes are developped in collaboration with EDF R&D. Working with two PhD students, Jean-Christophe Alais and of Vincent Leclère we have put emphasis on the implementation of price decomposition for specially structured large-scale problems under stochasticity. Our main application is dams management, but our perspective is the expansion of so-called smart power systems. The PhD student Maxence Jeunesse is working on measurability issues related to stochastic dynamic programming and probability constraints.

* Mathematical methods for sustainable management of natural resources

Michel De Lara focused on optimization in mining (international STIC-AmSud project OVIMINE), on viability methods for the control of dengue epidemics (Lilian Sepulveda's PhD co-supervised with Olga Vasilieva, Universidad del Valle, Cali, Colombia) and on fisheries ecosystem management under uncertainty (Esther Régnier's PhD co-supervised,with Katheline Schubert of University Paris 1).

- Scientific software NSP

This theme is driven by J.-P. Chancelier. In relation with the FUI project P, the software NSP has ongoing developments on two aspects: improvement of the port of Scicos 4.4 in NSP (with Alan Layec) and elaboration of a compiler with ALTAIR and INRIA partners.

- Operations research

Daniel Chemla, has defended his PhD on study of optimization problems arising with the operations of self-service transport systems. During his post-doc, Bernat Gacias has finished a work on the management of electric taxi fleets. With his PhD student Thomas Pradeau, Frédéric Meunier is now investigating the question of uniqueness of equilibrium in multiclass network. A new PhD student, Pauline Sarrabezolles, works on topics at the interface between linear programming and discrete geometry.

5. PDE and materials

The main subject studied by the PDE and Materials team is the dynamics of dislocation (PhDs of A. Le Guilcher, M. Al Haj, and L. Paszkowski). This work concerns differents scales, from microscopic scales (simplified atomic models, like the Frenkel-Kontorova model), models of dislocation dynamics (curves of defects moving in crystals, and responsible of elasto-visco-plastic properties of metals), up to the macroscopic scale with dislocation densities. Simultaneously, we also work on different topics: models of nanotubes (PhD of D. El Kass), models of traffic (PhD of G. Costeseque with IFSTTAR laboratory), seawater intrusion (PhD of G. Chmaycem), Navier-Stokes equations (Post-doc of L. Xue) and we also have collaboration projects with the LAMA laboratory.

STAFF

Researchers (16)

ALFONSI Aurélien, Applied Probability team, Ecole des Ponts ParisTech, research scientist, HdR
CANCES Eric, Molecular and Multiscale Simulations team, Ecole des Ponts ParisTech, research scientist, HdR
CHANCELIER Jean-Philippe, Optimization and Systems team, Ecole des Ponts ParisTech, research scientist, HdR
DABO Ismaila, Molecular and Multiscale Simulations team, Ecole des Ponts ParisTech, research scientist,
DE LARA Michel, Optimization and Systems team, Ecole des Ponts ParisTech, research scientist, HdR
DELMAS Jean-François, Applied Probability team, Ecole des Ponts ParisTech, research scientist, HdR
ERN Alexandre, Fluid Dynamics team, Ecole des Ponts ParisTech, research scientist, HdR
JOURDAIN Benjamin, Applied Probability team, Ecole des Ponts ParisTech, research scientist, HdR
LAPEYRE Bernard, Applied Probability team, Ecole des Ponts ParisTech, research scientist, HdR
LE BRIS Claude, Molecular and Multiscale Simulations team, Ecole des Ponts ParisTech, research scientist, HdR
LELIEVRE Tony, Molecular and Multiscale Simulations team, Ecole des Ponts ParisTech, research scientist, HdR
MEUNIER Frédéric, Optimization and Systems team, Ecole des Ponts ParisTech, research scientist, HdR
MONASSE Laurent, Fluid Dynamics team, Ecole des Ponts Paris Tech, research scientist
MONNEAU Régis, PDE and Materials team, Ecole des Ponts ParisTech, research scientist, HdR
ROUSSET Mathias, Molecular and Multiscale Simulations team, INRIA, research scientist,
STOLTZ Gabriel, Molecular and Multiscale Simulations team, Ecole des Ponts ParisTech, research scientist, HdR

Emeritus and Associated researchers (10)

BOULEAU Nicolas, Applied Probability team, Ecole des Ponts ParisTech, emeritus and research scientist, HdR
CARPENTIER Pierre, Optimization and systems, ENSTA, Research Scientist
EL HAJJ Ahmad (Univ. Compiègne), PDE and Materials team
IMBERT Cyril (Univ. Dauphine), PDE and Materials team
FORCADEL Nicolas (Univ. Dauphine), PDE and Materials team
KEBAIER, Ahmed (Univ. Paris 13), Applied Probability team
LEWIN Matthieu, Molecular and multiscale simulations, CNRS, Research scientist, HdR
NIER Francis (Prof., INRIA Délégation since Sept 2011)
POMMARET Jean-François, Optimization and Systems team, Ecole des Ponts ParisTech, emeritus research scientist, HdR
ZANETTE Antonino (Univ. Udine), Applied Probability team

External collaborators (14)

ABRAHAM Romain, Applied Probability, University of Orléans, Professor, HdR
ANDRIEU Laetitia, Optimization and systems, EDF, Research Scientist
BARLES Guy, PDE and Materials, University of Tours, Research Scientist, HdR
BARTY Kengy, Optimization and systems, Research, EDF
BOUCHUT François, Fluid dynamics, UPEMLV, CNRS, Research Scientist, HdR
BRIANI Ariela, PDE and Materials, University of Tours, Research Scientist,
CANNONE Marco, PDE and Materials, UPEMLV, Professor, HdR
CARDALIAGUET Pierre, PDE and Materials, University of Dauphine - Paris 9, Professor, HdR
CARLINI Elisabetta, PDE and Materials, University La Sapienza, Italia, Research
DALLAGI Anes, Optimization and systems, EDF, Research Scientist
GUERMOND Jean-Luc, Fluid dynamics, Texas A&M University, USA, HdR
LE MAITRE Olivier, Fluid dynamics, LIMSI-CNRS, University of Orsay, HdR
LEY Olivier, PDE and Materials, University Tours, Professor, HdR
VOHRALIK Martin, Fluid dynamics, LJLL, UPMC-CNRS, HdR

Invited Researchers (6)

GUERMOND Jean-Luc, Fluid dynamics, Texas A&M University, USA, HdR
HETMANIUK U., (University of Washington in Seattle), March 5-16, 2012, professeur invité INRIA)
KHOROMSKII B. AND KHOROMSKAIA V.,

(Max-Planck-Institute for Mathematics in the Sciences Leipzig), December 17-20, 2012.
LOZINSKI Alexei (Université de Besançon)
NGUETSENG G. (University of Yaoundé 1, Cameroon), March 19-30, 2012 (Professeur invité, INRIA),
PAVLIOTIS Grigorios (Professeur invité, INRIA)

Post-doctoral students (8)

ARAKELYAN Avetik, PDE and Materials team
DOBSON Matthew, Molecular and Multiscale Simulations team
DE MARCO, Stefano, Applied Probability team
GACIAS Bernat, Optimization and System team
LAYEC Alan, Optimization and Systems team
LI Kun, Molecular and Multiscale Simulations team
MIASOJEDOW Blazej, Applied Probability team
XUE Liutang, PDE and materials team.

Ph. D Students (32)

ALAIS Jean-Christophe, Optimization and Systems team ENPC, PhD student, CIFRE EDF, ED MSTIC
AL HAJ Mohammad, PDE and Materials team, PhD student, ENPC-CNRSL fellowship, ED MSTIC
BENOIT David, Molecular and Multiscale Simulations team, UPE Fellowship, PhD student, ED MSTIC,
BONELLE Jérôme, Fluid Dynamics team, PhD student, EDF fellowship, ED MSTIC
CASENAVE Fabien, Fluid Dynamics team, PhD, Student, IPEF, ED MSTIC,
CHALHOUB Nancy, Fluid Dynamics team, PhD student, ENPC-CNRSL fellowship, ED MSTIC
CHEMLA Daniel, Optimization and Systems team ENPC, PhD student, ENPC fellowship, ED MSTIC
COSTAOUEC Ronan, Molecular and Multiscale Simulations team, PhD student, ENPC fellowship, ED MSTIC
COSTESEQUE Guillaume, PDE and Materials team, PhD student, ITPE, ED MSTIC
EL KASS Danny, PDE and Materials team, PhD student, MESR fellowship, ED MSTIC
EHRLACHER Virginie, Molecular and Multiscale Simulations team, PhD student, IPEF, ED MSTIC
HENARD Olivier, Applied Probability team, PhD student, ENPC fellowship, ED MSTIC,
HOSCHEIT Patrick, Applied Probability team, PhD student, ENS fellowship, ED MSTIC,
INFANTE ACEVEDO, José Arturo, Applied Probability team, PhD student, AXA Fundation fellowhip, ED MSTIC
JEUNESSE Maxence, Applied Probability team, PhD student, Chair "Measue of financial risks" fondation du risque, fellowship, ED MSTIC
JOUBAUD Rémi, Fluid dynamics team, PhD student, ANDRA fellowship, ED MISTIC
LAHBABI Salma Molecular and Multiscale Simulations team, PhD student, CNRS fellowship ED EM2C,
LECLERE Vincent, Optimization and Systems team, IPEF, ED MSTIC
LE GUILCHER Arnaud, PDE and Materials team, PhD student, IPEF, ED MSTIC
LUSSO Christelle, Fluid Dynamics team, PhD student, ENPC fellowship, ED MSTIC
MINT MOUSTAPHA Jyda, Applied Probability team, PhD student, IFSTTAR fellowship, ED MSTIC
PALIDA Ernesto, Applied Probability team, CaLyon fellowship, ED MSTIC
PASZKOWSKI Lukasz, PDE and Materials team, PhD student, polish fellowship, Wroclaw University
PRADEAU Thomas, Optimization and Systems team, ENS fellowship, ED MSTIC
PUSCAS Adela, Fluid Dynamics team, PhD student, CEA fellowship, ED MSTIC
REGNIER Esther, Optimization and Systems team and University Paris 1, PhD student,
REYGNER Julien, Applied Probability team, PhD student, IPEF
ROUSSEAU Marie, Fluid Dynamics team, PhD student, ENPC fellowship, ED MSTIC
SMADI Charline, Applied Probability team, PhD student, IPEF, ED MSTIC
SEPULVEDA Lilian, Optimization and systems Team, Colombian professor, ED MSTIC
THOMINES Florian, Molecular and Multiscale Simulations team, phD student, IPEF, ED MSITC
TRYOEN Julie, Fluid Dynamics team, PhD student, ENPC fellowship, ED MSTIC

Starting PhD students (8)

AL RACHID, Houssam, Molecular and Multiscale Simulations team, ENPC-CNRSL fellowship, PhD student, ED MSTIC
BLANC Pierre, Applied Probability team, PhD student, ENPC- NATIXIS fellowship, ED MSTIC,

CHMAYCEM Ghada, PDE and Materials team, PhD student, ENPC-CNRSL fellowship, ED MSTIC
GONTIER David, Molecular and Multiscale Simulations team, PhD student, ENS fellowship, ED MSTIC
MINVIELLE William, Molecular and Multiscale Simulations team, PhD student, labex MMCD fellowship, ED MSTIC
MOURAD Nadia, Molecular and Multiscale Simulations team, PhD student, ENPC-CNRSL fellowship, ED MSTIC
REY Clément, Applied Probability team, PhD student, ENPC fellowship, ED MSTIC,
SARRABEZOLLES Pauline, Optimization and Systems team, AMX fellowship, ED MSTIC

Internship students (12)

COHEN Mickael
CELEBI Arcadan
GONTIER David
GUPTA Rachana
HOMMAN Ahmed Ahmine
LAMBERT Théophile
MINVIELLE William
NECTOUX Boris
RINGEVAL Axel
ROBIN Yoann
ROJAS CARULLA Mateo
RUGAMA Jimenez

Administrative Assistants (3)

BACCAERT Catherine, Ecole des Ponts ParisTech
PHOUDIAH Eve-Marie, Ecole des Ponts Paris Tech
QUELLEU Nathalie, Ecole des Ponts ParisTech

QUANTITATIVE RESULTS

KNOWLEDGE PRODUCTION

PUBLICATIONS

Scientific books

The book "From general mechanics to discontinuity : unified approach to elasticity", (French) by **C. Mariotti, L. Monasse** was published by Presses des Ponts in November 2011 (ISBN-13: 978-2859784607).

The book "Mathematical Aspects of Discontinuous Galerkin Methods" by **D. Di Pietro and A. Ern** was published by Springer in 2012 (ISBN-13: 978-3642229794).

The book "Introduction to probability and statistic, exercises and problems with corrections" (in Franch) by **J.-F Delmas** has been published by Presse de l'ENSTA in 2012 (ISBN-13: 978-2722509375).

Publications in a international journals Journals with review committee

Abraham R., Delmas J. F., "A continuum-tree-valued Markov process", *Annals of Probability*, 40 (3), 1167-1211, (2012), DOI:10.1214/11-aop644

Abraham R., Delmas J. F., He, H., "Pruning Galton-Watson Trees and Tree-valued Markov Processes"
Annales Institut H. Poincaré, 48 (3), 688-705, (2012), DOI:10.1214/11-AIHP423

Alfonsi, A., Schied, A. and Slynko, A. (2012). Order Book Resilience, Price Manipulation, and the Positive Portfolio Problem, SIAM J. Finan. Math., Vol.3, DOI:10.1137/110822098

Alfonsi, A. and Lelong, J. (2012). A closed-form extension to the Black-Cox model, International Journal of Theoretical and Applied Finance, Vol.15, No.8. DOI:10.1142/S0219024912500537

Anantharaman A., Le Bris C., "Elements of Mathematical Foundations for Numerical Approaches for Weakly Random Homogenization Problems", *Communications in Computational Physics*, 11 (4), 1103-1143, (2012), DOI:10.4208/cicp.030610.010411s

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Andreussi O., Dabo I., Marzari N., "Revised self-consistent continuum solvation in electronic-structure calculations", *Journal of Chemical Physics*, 136 (6), (2012), DOI:10.1063/1.3676407

Bernardin C., Stoltz G., "Anomalous diffusion for a class of systems with two conserved quantities", *Nonlinearity*, 25 (4), (2012), DOI:10.1088/0951-7715/25/4/1099

Blanc X., Costaouec R., Le Bris C., Legoll F., "Variance Reduction in Stochastic Homogenization Using Antithetic Variables", *Markov Processes and Related Fields*, 18 (1), 31-66, (2012)

Blanc X., Legoll F.,. A numerical strategy for coarse-graining two-dimensional atomistic models at finite temperature: the membrane case, in "Computational Materials Science", 2012, vol. 66, p. 84–95, http://hal. archives-ouvertes.fr/hal-00627294.

Blanc X., Le Bris C., Lions P-L.,. A possible homogenization approach for the numerical simulation of periodic microstructures with defects, in "Milan Journal of Mathematics", 2012, vol. 80, p. 351-367.

Blanc X., Le Bris C., Lions P-L., From the Newton equation to the wave equation in some simple cases, in "Networks and

Heterogeneous Media", 2012, vol. 7, no 1, p. 1-41.

Blanchard M., Morin G., Lazzeri M., Balan E., Dabo I., "First-principles simulation of arsenate adsorption on the (1(1)over-bar2) surface of hematite", Geochimica et Cosmochimica Acta, 86 182-195, (2012), DOI:10.1016/j.gca.2012.03.013

Burman E., Ern A., "Implicit-explicit Runge-Kutta schemes and finite elements with symmetric stabilization for advection-diffusion equations", *ESAIM: Mathematical Modelling and Numerical Analysis*, 46 (4), 681-707, (2012), DOI:10.1051/m2an/2011047

Cacace S., Chambolle A., Monneau R., "A posteriori error estimates for the effective Hamiltonian of dislocation dynamics", *Numerische Mathematik*, 121 (2), 281-335, (2012), DOI:10.1007/s00211-011-0430-z

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Cancès E., Chakir R., Maday Y., "Numerical analysis of the planewave discretization of some orbital-free and Kohn-Sham models", *Esaim-Mathematical Modelling and Numerical Analysis-Modelisation Mathematique Et Analyse Numerique*, 46 (2), 341-388, (2012), DOI:10.1051/m2an/2011038

Cancès E., Ehrlacher V., Maday Y., "Periodic schrödinger operators with local defects and spectral pollution", *Siam Journal on Numerical Analysis*, 50 (6), 3016-3035, (2012), DOI:10.1137/110855545

Cancès E., Stoltz G., "A mathematical formulation of the random phase approximation for crystals", *Annales De L Institut Henri Poincare-Analyse Non Lineaire*, 29 (6), 887-925, (2012), DOI:10.1016/j.anihpc.2012.05.004

Carpentier P., Chancelier J. P., Cohen G., De Lara M., Girardeau P., "Dynamic consistency for stochastic optimal control problems", Annals of Operations Research, 200 (1), 247-263, (2012), DOI:10.1007/s10479-011-1027-8

Casenave F., "Accurate a posteriori error evaluation in the reduced basis method", Comptes Rendus Mathematique, 350 (9-10), 539-542, (2012), DOI:10.1016/j.crma.2012.05.012

Casenave F., Ghattassi M. et Joubaud R., "A multiscale problem in thermal science", ESAIM: PROCEEDINGS, December 2012, Vol. 38,p.202-219,
DOI : 10.1051/proc/201238011

Chambolle A., Lindgren E., Monneau R., "A Hölder infinity Laplacian", *ESAIM - Control, Optimisation and Calculus of Variations*, 18 (3), 799-835, (2012), DOI:10.1051/cocv/2011182

Chen Y. T., Delmas J. F., "Smaller population size at the MRCA time for stationary branching processes", *Annals of Probability*, 40 (5), 2034-2068, (2012), DOI:10.1214/11-aop668

Chopin N., Lelievre T., Stoltz G., "Free energy methods for Bayesian inference: efficient exploration of univariate Gaussian mixture posteriors", *Statistics and Computing*, 22 (4), 897-916, (2012), DOI:10.1007/s11222-011-9257-9

Dabo I., "Resilience of gas-phase anharmonicity in the vibrational response of adsorbed carbon monoxide and breakdown under electrical conditions", *Physical Review B - Condensed Matter and Materials Physics*, 86(3),(2012), DOI:10.1103/PhysRevB.86.035139

Dai X., Le Bris C., Legoll F., Maday Y.,*Symmetric parareal algorithms for Hamiltonian systems,* in "Mathematical Modelling and Numerical Analysis", 2012, in press

---

De Lara M., Ocana E., Oliveros-Ramos R., Tam J., "Ecosystem Viable Yields", *Environmental Modeling & Assessment*, 17 (6), 565-575, (2012), DOI:10.1007/s10666-012-9321-7

De Marco S., Martini C., "The term structure of implied volatility in symmetric

models with applications to heston", *International Journal of Theoretical and Applied Finance*, 15 (4), (2012), DOI:10.1142/s0219024912500264

Di Girolami C., Russo F., "Generalized covariation and extended Fukushima decomposition for banach space-valued processes: Applications to windows of dirichlet processes", *Infinite Dimensional Analysis, Quantum Probability and Related Topics*, 15 (2), (2012), DOI:10.1142/s0219025712500075

Di Pietro D. A., Ern A., "Analysis of a discontinuous galerkin method for heterogeneous diffusion problems with low-regularity solutions", *Numerical Methods for Partial Differential Equations*, 28 (4), 1161-1177, (2012), DOI:10.1002/num.20675

Dobson M., Ortner C., Shapeev A. V., "The spectrum of the force-based quasicontinuum operator for a homogeneous periodic chain", *Multiscale Modeling and Simulation*, 10 (3), 744-765, (2012), DOI:10.1137/110825704

Dobson M., Le Bris C., Legoll F.,Symplectic schemes for highly oscillatory Hamiltonian systems: the homogenization approach beyond the constant frequency case, in "IMA Journal of Numerical Analysis", 2012, in press, http://hal.archives-ouvertes.fr/hal-00524814.

Ern A., Joubaud R., Lelievre T., "Mathematical study of non-ideal electrostatic correlations in equilibrium electrolytes", *Nonlinearity*, 25 (6), 1635-1652, (2012), DOI:10.1088/0951-7715/25/6/1635

Ern A., Mozolevski I., "Discontinuous Galerkin method for two-component liquid-gas porous media flows", *Computational Geosciences*, 16 (3), 677-690, (2012), DOI:10.1007/s10596-012-9277-3

Fino A. Z., Ibrahim H., Monneau R., "The Peierls-Nabarro model as a limit of a Frenkel-Kontorova model", *Journal of Differential Equations*, 252 (1), 258-293, (2012), DOI:10.1016/j.jde.2011.08.007

Forcadel N., Imbert C., Monneau R., "Homogenization of accelerated Frenkel-Kontorova models with N types of particles", *Transactions of the American Mathematical Society*, 364 (12), 6187-6227, (2012), DOI:10.1090/s0002-9947-2012-05650-9

Francisco J. B., Bazan F. S. V., "Nonmonotone algorithm for minimization on closed sets with applications to minimization on Stiefel manifolds", *Journal of Computational and Applied Mathematics*, 236 (10), 2717-2727, (2012), DOI:10.1016/j.cam.2012.01.014

Forcadel N., Imbert C., Monneau R., Uniqueness and existence of spirals moving by forced mean curvature motion, Interfaces and Free Boundaries 14 (2012), 365-400.
DOI 10.4171/IFB/285

Gacias B., Cegarra J., Lopez P., "Scheduler-oriented algorithms to improve human-machine cooperation in transportation scheduling support systems", *Engineering Applications of Artificial Intelligence*, 25 (4), 801-813, (2012), DOI:10.1016/j.engappai.2011.11.010

Gonzalez M.D.M., Monneau R., Slow motion of particle systems as a limit of a reaction-diffusion equation with half-Laplacian in dimension one, DCDS-A 32 (4) (2012), 1255-1286. doi:10.3934/dcds.2012.32.1255

He L., Le Bris C., Leliévre T., "Periodic long-time behaviour for an approximate model of nematic polymers", *Kinetic and Related Models*, 5 (2), 357-382, (2012), DOI:10.3934/krm.2012.5.357

Himmetoglu B., Marchenko A., Dabo I., Cococcioni M., "Role of electronic

localization in the phosphorescence of iridium sensitizing dyes", *Journal of Chemical Physics*, 137 (15), (2012), DOI:10.1063/1.4757286

Jeunesse M., Jourdain B., "Regularity of the American Put option in the Black-Scholes model with general discrete dividends", *Stochastic Processes and Their Applications*, 122 (9), 3101-3125, (2012), DOI:10.1016/j.spa.2012.05.009

Joubaud R., Stoltz G., "Nonequilibrium shear viscosity computations with Langevin dynamics", *Multiscale Modeling and Simulation*, 10 (1), 191-216, (2012), DOI:10.1137/110836237

Jourdain B., "Equivalence of the Poincaré inequality with a transport-chi-square inequality in dimension one", *Electronic Communications in Probability*, 17 (2012), DOI:10.1214/ECP.v17-2115

Jourdain B., Meleard S., Woyczynski W. A., "Lévy flights in evolutionary ecology", *Journal of Mathematical Biology*, 65 (4), 677-707, (2012), DOI:10.1007/s00285-011-0478-5

Jourdain B., Sbai M., "Coupling index and stocks", *Quantitative Finance*, 12 (5), 805-818, (2012), DOI:10.1080/14697681003785959

Le Bris C., Lelievre T., "Micro-macro models for viscoelastic fluids: modelling, mathematics and numerics", *Science China-Mathematics*, 55 (2), 353-384, (2012), DOI:10.1007/s11425-011-4354-y

---

Le Bris C., Lelièvre T., Luskin M., Perez D., "A mathematical formalization of the parallel replica dynamics", *Monte Carlo Methods and Applications*, 18 (2), 119-146, (2012), DOI:10.1515/mcma-2012-0003

Le Bris C., Thomines F., "A reduced basis approach for some weakly stochastic multiscale problems", *Chinese Annals of Mathematics. Series B*, 33 (5), 657-672, (2012), DOI:10.1007/s11401-012-0736-x

---

Le Bris C., Legoll F., Thomines F.,
Rate of convergence of a two-scale expansion for some "weakly" stochastic homogenization problems, in "Asymptotic Analysis", 2012, vol. 80, p. 237-267

Lelièvre T., Rousset M., Stoltz G., "Langevin dynamics with constraints and computation of free energy differences", *Mathematics of Computation*, 81 (280), 2071-2125, (2012), DOI:10.1090/s0025-5718-2012-02594-4

Le Peutrec D., Nier F., Claude V. Precise Arrhenius Law for p-forms: The Witten Laplacian and Morse-Barannikov Complex, in "Annales Henri Poincaré", 2012, 44p

---

Liverani C., Olla S., "Toward the Fourier law for a weakly interacting anharmonic crystal", *Journal of the American Mathematical Society*, 25 (2), 555-583, (2012), DOI:10.1090/s0894-0347-2011-00724-8

Meunier F., Neveu B., "Computing solutions of the paintshop-necklace problem", *Computers & Operations Research*, 39 (11), 2666-2678, (2012), DOI:10.1016/j.cor.2012.01.014

Monasse L., Daru V., Mariotti C., Piperno S., Tenaud C., "A conservative coupling algorithm between a compressible flow and a rigid body using an Embedded Boundary method", *Journal of Computational Physics*, 231 (7), 2977-2994, (2012), DOI:10.1016/j.jcp.2012.01.002

Monasse L., Mariotti C., "An energy-preserving Discrete Element Method for elastodynamics", *ESAIM: Mathematical Modelling and Numerical Analysis*, 46 (6), 1527-1553, (2012), DOI:10.1051/m2an/2012015

Monneau R., Patrizi S., "Derivation of Orowan's Law from the Peierls-Nabarro Model", *Communications in Partial Differential Equations*, 37 (10), 1887-1911, (2012), DOI:10.1080/03605302.2012.683504

Monneau R., Patrizi S., "Homogenization of the Peierls-Nabarro model for dislocation dynamics", *Journal of Differential Equations*, 253 (7), 2064-2105, (2012), DOI:10.1016/j.jde.2012.06.019

Rousseau M., Cerdan O., Ern A., Le Maître O., Sochala P., "Study of overland flow with uncertain infiltration using stochastic tools", *Advances in Water Resources*, 38 1-12, (2012), DOI:10.1016/j.advwatres.2011.12.004

Schmuck M., Pradas M., Pavliotis G. A., Kalliadasis S., "Upscaled phase-field models for interfacial dynamics in strongly heterogeneous domains", *Proceedings of the Royal Society a-Mathematical Physical and Engineering Sciences*, 468 (2147), 3705-3724, (2012), DOI:10.1098/rspa.2012.0020

Seck B., Andrieu L., De Lara M., "Parametric multi-attribute utility functions for optimal profit under risk constraints", *Theory and Decision*, 72 (2), 257-271, (2012), DOI:10.1007/s11238-011-9255-6

Tryoen J., Le Maitre O., Ern A., "Adaptive anisotropic spectral stochastic methods for uncertain scalar conservation laws", *Siam Journal on Scientific Computing*, 34 (5), A2459-A2481, (2012), DOI:10.1137/120863927

Publications in other journal

Boutang J., De Lara M., Comment intégrer les controverses ?, Paroles d'économistes, Conseil économique pour le développement durable, juin 2012.

Boutang J., De Lara M., Les dimensions nouvelles des controverses entre énergie et environnement, Le Monde.fr, Idées, 26/01/2012.

Book chapters

Chancelier J-P., in D'ANDRÉA-NOVEL B., FABRE B., JOUVELOT P. "Acoustique-Informatique-Musique, Outils scientifiques pour la musique", Presses des Mines, 2012

Legoll F., Lelièvre T.,. Some remarks on free energy and coarse-graining, O. R. B. ENGQUIST (editor), Lecture Notes in Computational Science and Engineering, Springer, 2012, vol. 82, p. 279–329, http://hal. inria.fr/hal-00511221.

Stoltz G., Calculation of ensemble averages, Encyclopedia of Applied and Computational Mathematics, Springer, 2012.

Stoltz G., Computation of free energy differences, Encyclopedia of Applied and Computational Mathematics, Springer, 2012.

Stoltz G., Leimkuhler B., Sampling techniques for computational statistical physics, Encyclopedia of Applied and Computational Mathematics, Springer, 2012.

Written communications in International conferences

E. Cancès, S. Lahbabi, M. Lewin. "Mean-field electronic structure models for disordered materials". In **Proceeding of the international Congress on Mathematical Physics, Aalborg (Denmark), August 2012, 2012.arXiv:1203.0402.**

Invited talk in international conference

C. Le Bris, plenary lecture, 60-th annual SIAM meeting, July 2012, Minneapolis, USA.

C. Le Bris, keynote lecturer, 2012 Woudschoten Conference, October, 2012, Zeist, The Netherlands.

M. De Lara, Latin American Workshop on Optimization and Control LAWOC, Universidad Técnica Federico Santa María - Valparaiso – Chile, 12 January 2012

M. De Lara, The Royal Golden Jubilee Ph.D. Congress XIII, Pattaya, Thailand, April 6-8, 2012

M. De Lara, Dynamic Days, Cartagena, Colombia, 20 November 2012

J.-F. Delmas, Workshop on stochastic analysis and statistical inference of branching processes, Beijing (China), April 2012.

A. Ern : "Adaptive inexact Newton methods for discretizations of nonlinear diffusion PDEs", Swiss Numerics Colloquium, Bern, April 2012.

B. Jourdain, Workshop "Sequential Monte Carlo methods and efficient simulation in finance", Ecole Polytechnique, 10-12 october 2012

T. Lelièvre, plenary speaker at the EVOLVE 2012 conference, Mexico, August 2012.

R. Monneau, February 27 to March 2, Nonlocal PDEs, Variational Problems and their Applications, IPAM, UCLA, Los Angeles, USA

R. Monneau, June 11-15 in 2012, Free Boundary Problems: Theory and Applications, Frauenchiemsee, Germany.

Invited talk in national conference

M. De Lara, GDR MASCOT NUM, Paris, 11 May 2012

M. De Lara, CEA EDF Inria - Systemic Risk and Quantitative Risk Management, 15-17 October 2012

M. De Lara, Colloque National sur l'Assimilation de Données, Nice, 17--19 December 2012

M. De Lara, Maths Horizon 2012 Days, FSMP, SMF, Paris, 19 December 2012

J.-F Delmas, Workshop ANR MANEGE CIRM MARSEILLE (France), June 2012

J.-F Delmas, Workshop ANR A3, CIRM Marseilles (France), September 2012.

A. Ern, Momas Workshop on Multiphase flows, Nice, October 2012.

A. Ern, Momas Workshop on Numerical methods for flows, Marseille, October 2012.

T. Lelièvre, plenary speaker at the CANUM conference, Superbesse, May 2012.

C. Lusso, CANUM 2012, Superbesse, France

Platform presentation/presentation in international conference

M. De Lara, 2012 Franco-Thai Symposium, Bangkok, Thailand, 1-3 February 2012

A. Ern : UMH Workshop, Stresa, June 2012.

A. Ern : CMAM Conference, Berlin, July/August 2012.

A. Ern : Algoritmy, Podbanske, Slovakia, September 2012.

A. Ern : FORTH Workshop, Heraklion, September 2012.

Platform presentation/presentation in national conference

M. De Lara, ROADEF 2012, Angers, 11-13 April 2012

Poster in international conference

D. Benoit
MMM, Singapore, Singapore, october 2012.

F. Casenave,
MOREPASII, October 2012, Gunzburg, Germany

S.Lahbabi
Los Angeles, USA, October 2012

W.Minvielle,
IPAM, Los Angeles - USA, December 2012

Preprint-hal

Abraham R., Delmas J.-F., "A construction of a β-coalescent via the pruning of Binary Trees", (2012), http://hal.archives-ouvertes.fr/hal-00711518

Abraham R., Delmas J.-F., "The forest associated with the record process on a Lévy tree", (2012), http://hal.archives-ouvertes.fr/hal-00686569

Abraham R., Delmas J.-F., He H., "Pruning of CRT-sub-trees", (2012), http://hal.archives-ouvertes.fr/hal-00763707

Abraham R., Delmas J.-F., Hoscheit P., "Exit times for an increasing Lévy tree-valued process", (2012), http://hal.archives-ouvertes.fr/hal-00673870

Abraham R., Delmas J.-F., Hoscheit P., "A note on Gromov-Hausdorff-Prokhorov distance between (locally) compact measure spaces", (2012), http://hal.archives-ouvertes.fr/hal-00673921

Al Haj M., Forcadel N., Monneau R., "Existence and uniqueness of traveling waves for fully overdamped Frenkel-Kontorova models", (2012), http://hal.archives-ouvertes.fr/hal-00721233

Alfonsi A., "Strong convergence of some drift implicit Euler scheme. Application to the CIR process", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00709202

Alfonsi A., Infante Acevedo J., "Optimal execution and price manipulations in time-varying limit order books", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00687193

Alfonsi A., Jourdain B., Kohatsu-Higa A., "Pathwise optimal transport bounds between a one-dimensional diffusion and its Euler scheme", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00727430

Alfonsi A., Schied A., "Capacitary measures for completely monotone kernels via singular control", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00659421

Benoit D., He L., Bris C. L., Lelièvre T., "Mathematical analysis of a one-dimensional model for an aging fluid", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00676678

Bonelle J., Ern A., "Analysis of Compatible Discrete Operator Schemes for Elliptic

Problems on Polyhedral Meshes", (2012), http://hal.archives-ouvertes.fr/hal-00751284

Caffarelli L. A., Monneau R., "Counter-example in 3D and homogenization of geometric motions in 2D", (2012), http://hal.archives-ouvertes.fr/hal-00720954

Cances E., Ehrlacher V., Lelièvre T., "Greedy algorithms for high-dimensional non-symmetric linear problems", (2012), http://hal.archives-ouvertes.fr/hal-00745611

Cances E., Ehrlacher V., Maday Y., "Non-consistent approximations of self-adjoint eigenproblems: Application to the supercell method", (2012), http://hal.archives-ouvertes.fr/hal-00694017

Cances E., Lahbabi S., Lewin M., "Mean-field models for disordered crystals", (2012), http://hal.archives-ouvertes.fr/hal-00675594

Casenave F., Ern A., Lelièvre T., "Accurate and efficient evaluation of the a posteriori error estimator in the reduced basis method", (2012), http://hal.archives-ouvertes.fr/hal-00761735

Cérou F., Guyader A., Lelièvre T., Malrieu F., "On the length of one-dimensional reactive paths", (2012), http://hal.archives-ouvertes.fr/hal-00704704

Chemla D., Meunier F., Wolfler Calvo R., "Bike sharing system: solving the static rebalancing problem", (2012), http://hal.archives-ouvertes.fr/hal-00726617

Dobson M., Legoll F., Lelièvre T., Stoltz G., "Derivation of Langevin Dynamics in a nonzero Background Flow Field", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00680278

Doyen D., Ern A., Piperno S., "Quasi-explicit time-integration schemes for dynamic fracture with set-valued cohesive zone models", (2012), http://hal.archives-ouvertes.fr/hal-00736779

A. El Hajj, R. Monneau, Some uniqueness results for diagonal hyperbolic systems with large and monotone data, preprint (2010): http://hal.archives-ouvertes.fr/hal-00534134

El Kass D., Monneau R., "Atomic to continuum passage for nanotubes. Part I: a discrete Saint-Venant principle", (2012), http://hal.archives-ouvertes.fr/hal-00731842

El Kass D., Monneau R., "Atomic to continuum passage for nanotubes. Part II: error estimates", (2012), http://hal.archives-ouvertes.fr/hal-00731845

Ern A., Vohralik M., "Four closely related equilibrated flux reconstructions for nonconforming finite elements", (2012), http://hal.inria.fr/hal-00750777

Estanislao A., Meunier F., "A business dinner problem", (2012), http://hal.archives-ouvertes.fr/hal-00738003

Fort G, Jourdain B., Kuhn E., Lelièvre T., Stoltz G., "Convergence and efficiency of the Wang-Landau algorithm", (2012) http://hal.inria.fr/hal-00721886

Foucart C., Hénard O., "Stable continuous branching processes with immigration and Beta-Fleming-Viot processes with immigration", (2012), http://hal.archives-ouvertes.fr/hal-00678259

Gacias B., Meunier F., "Operating a fleet of electric taxis", (2012), http://hal.archives-ouvertes.fr/hal-00721875

Ghorbel A., Monneau R., "Existence and non-existence of semi-discrete shocks for a

car-following model in traffic flow", (2012), http://hal.archives-ouvertes.fr/hal-00760671

Hénard O., "Change of measure in the lookdown particle system", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00684664

Hoscheit P., "Fluctuations for the number of records on subtrees of the Continuum Random Tree", (2012), http://hal.archives-ouvertes.fr/hal-00768343

Issa S., Jazar M., Monneau R., "Existence of supersonic traveling waves for the Frenkel-Kontorova model", (2012), http://hal.archives-ouvertes.fr/hal-00684236

M. Jazar, R. Monneau, Formal derivation of seawater intrusion models, preprint (2010): http://hal.archives-ouvertes.fr/hal-00534134

Jourdain B., "Equivalence of the Poincaré inequality with a transport-chi-square inequality in dimension one", (2012), http://hal.archives-ouvertes.fr/hal-00711885

Jourdain B., Lelièvre T., Miasojedow B., "Optimal scaling for the transient phase of Metropolis Hastings algorithms: the longtime behavior", (2012), http://hal.archives-ouvertes.fr/hal-00768855

Jourdain B., Lelièvre T., Miasojedow B., "Optimal scaling for the transient phase of the random walk Metropolis algorithm: the mean-field limit", (2012), http://hal.archives-ouvertes.fr/hal-00748055

Jourdain B., Reygner J., "Propagation of chaos for rank-based interacting diffusions and long time behaviour of a scalar quasilinear parabolic equation", (2012), http://hal-enpc.archives-ouvertes.fr/hal-00755269

Le Bris C., Rouchon P. Low rank approximation for the numerical simulation of high dimensional Lindblad equations, in (2012) http://hal.archives-ouvertes.fr/hal-00719907.

Le Bris C., Legoll F. , Thomines F.. Multiscale Finite Element approach for "weakly" random problems and related issues, (2012), http://hal.archives-ouvertes.fr/hal-00639349

Legoll F., Lelièvre T., Samaey G., "A micro-macro parareal algorithm: application to singularly perturbed ordinary differential equations", (2012), http://hal.archives-ouvertes.fr/hal-00691939

Lelièvre T., "Two mathematical tools to analyze metastable stochastic processes", (2012), http://hal.inria.fr/hal-00661385

Lelièvre T., Nier F., Pavliotis G. A., "Optimal non-reversible linear drift for the convergence to equilibrium of a diffusion", (2012), http://hal.archives-ouvertes.fr/hal-00761688

Meunier F., Pradeau T., "Uniqueness of equilibrium on rings", (2012), http://hal.archives-ouvertes.fr/hal-00711094

Monneau R., Roussignol M., Tordeux A., "Invariance and homogenization of an adaptive time gap car-following model", (2012), http://hal.archives-ouvertes.fr/hal-00757118

Pommaret J.-F., "Deformation cohomology of algebraic and geometric structures", (2012), http://hal.archives-ouvertes.fr/hal-00715284

Pommaret J.-F., "A pedestrian approach to cosserat / maxwell / weyl theory", (2012), http://hal.archives-ouvertes.fr/hal-00740314

Pommaret J.-F., "Relative parametrization of linear multidimensional systems", (2012), http://hal.archives-ouvertes.fr/hal-00766775

Rousseau M., Cerdan O., Delestre O., Dupros F., James F., Cordier S., "Overland flow modelling with the Shallow Water Equation using a well balanced numerical scheme: Adding efficiency or just more complexity?", (2012), http://hal.archives-ouvertes.fr/hal-00664535

CONFERENCES/SEMINARS/ MISSIONS/VISITS

De Lara M., ElectroPeru and PECIER (Comision de Integracion Regional del Peru), Lima, Peru, 2 March 2012

De Lara M., National Electronics and Computer Technology Center (NECTEC), Bangkok, Thailand, 3 April 2012

De Lara M., University FGV, Rio de Janeiro, Brazil, 25 September 2012

De Lara M., Prospective Days, Ministry of Equipment, 19 October 2012

De Lara M., OVIMINE, Delphos and Universidad de Chile, Santiago, Chile, 8 November 2012

De Lara M., Consejo Departamental de Lima del Colegio de Ingenieros del Peru, Lima, Peru, 9 November 2012

De Lara M., IMCA, Lima, Peru, 10 November 2012

De Lara M., Unidad de planeacion minero energética, UPME, Bogota, Colombia, 16 november 2012

De Lara M., XM/ISA, Medellin, Colombia, 7 december 2012

Meunier F., UCHILE, Santiago, Chile, January 5-12, 2012.

Meunier F., McMaster University, Hamilton, Canada, April 29 – May 3 2012.

Meunier F., Seminar, Fields Institute, Toronto, Canada, May 1 2012.

Monneau R., 3 months from February to April, invited professor at the Lebanese University, Lama-Liban,Tripoli,Lebanon

Monneau R., April 29 to May 3, collaboration at Chicago University.

Nier F., November 2012, Invited for one week in Tokyo at Japan University.

Conferences/participation

International conferences Communications

A. Alfonsi, Workshop Sequential Monte Carlo methods and Efficient simulation in Finance at Ecole Polytechnique, October 2012,

D. Benoit, International Workshop on Numerical Methods for Non-Newtonian Flows, Blois (France), March 2012,

D. Benoit, Congrès CANUM 2012, Superbesse (France), May 2012,

D. Benoit, Multiscale Materials Modeling (MMM) conference 2012, Singapour (Singapour), Octo- ber 2012

J. Bonelle, workshop on Discretization Methods for Polygonal and Polyhedral Meshes, Milano, September 2012

E. Cancès, Mathematics meets Chemistry workshop, Erlangen, Germany, March 2012,

E. Cancès, AIMS 2012, Orlando, USA, July 2012,

E. Cancès, ICMP 2012, Aalborg, Denmark, August 2012,

E. Cancès, IPAM workshop, Los Angeles, USA, October 2012

E. Cancès, Lectures (6h) on spectral theory for electronic structure modeling, Chinese Academy of Sciences, Beijing, China, April 2012,

---

E. Cancès, Lectures (2h) on numerical methods for Density Functional Theory, Ecole des Houches, June 2012,

---

E. Cancès, K. Burke's group meeting, chemistry department, Irvine University, USA, October 2012,

---

E. Cancès, NAS group meeting, physics department, Louvain-la-Neuve, Belgium, November 2012,

---

I. Dabo, Young Engineers and Scientists Symposium, University of California, Berkeley, March 2012

I. Dabo, American Physical Society Meeting, Boston, March 2012

I. Dabo, Workshop on Corrective Approaches to DFT for Strongly-correlated Systems, CECAM, EPFL, Lausanne, June 2012

I. Dabo, PRACE F2F Workshop, CEA Saclay, June 2012

I. Dabo, 2nd TYC Energy Materials Workshop, Thomas Young Centre, King's College, London, June 2012

I. Dabo, Energy from the Sun: Computational Chemists and Physicists Take Up the Challenge, CECAM Conference, Cagliari, September 2012

I. Dabo, CECAM Meeting on Electron Correlation, Ecole Polytechnique, Palaiseau, December 2012

V. Ehrlacher, SIAM Conference on Uncertainty Quantification, Raleigh, USA, April 2012.

V. Ehrlacher, workshop on Mathematical and Numerical Analysis of Electronic Structure Models, Beijing, China, June 2012.

V. Ehrlacher, 9th AIMS Conference on Dynamical Systems,Differential Equations and Applications, Orlando, USA, July 2012.

V. Ehrlacher, IPAM MD2012 Seminar Series, Los Angeles, USA, September 2012.
Project-Team MICMAC 19

V. Ehrlacher, IPAM Workshop IV: Computational Methods for Multiscale Modeling of Materials Defects, Los Angeles, USA, December 2012.

B. Jourdain, 8th World Congress in Probability and Statistics, Istanbul, 8-15 july 2012

C. Le Bris, Workshop Inhomogeneous Random Systems IRS2012, Institut Henri Poincaré (Paris), January 2012.

C. Le Bris, International conference on PDEs, Shanghai, June 2012

C. Le Bris, Lectures on Stochastic homogenization, Series of 90-minute lectures, Summer course on homogenization, Chicago, June 18-29, 2012.

C. Le Bris, ICMS workshop Edinburgh, June 2012

C. Le Bris, ACMAC workshop on Image and waves in complex media, June 2012, Heraklion, Crete.

C. Le Bris, Journées MMCS, Université de Lyon, September 2012.

C. Le Bris, IPAM program on " Materials Defects: Mathematics, Computation, and Engineering", December 2012.

T. Lelièvre, Workshop on Multiscale Modeling, Simulation, Analysis and Application, Singapore, January 2012.

T. Lelièvre, Workshop on Interplay of Analysis and Probability in Physics, Oberwolfach, January 2012.

T. Lelièvre, Workshop BEMOD12 "Beyond Molecular Dynamics: Long Time Atomic-Scale Simu- lations", MPIPKS, Dresden, March 2012.

T. Lelièvre, Workshop "Computation of transition trajectories and rare events in non-equilibrium systems", ENS Lyon, June 2012.

T. Lelièvre, Journées ERGONUM "Analyse probabiliste des systèmes en temps long", INRIA Sophia-Antipolis, June 2012.

T. Lelièvre, AIMS conference, Orlando, July 2012.

T. Lelièvre, Workshop "Modelling the Dynamics of Complex Molecular Systems", Lorentz Center, Leiden, August 2012.

T. Lelièvre, Tutorial "Materials Defects", IPAM, Los Angeles, September 2012,

---

T. Lelièvre, Workshop "Quantum and Atomistic Modeling of Materials Defects", IPAM, Los Angeles, October 2012,

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T. Lelièvre, Workshop "Nonequilibrium Statistical Mechanics: Mathematical Understanding and numerical Simulation" BIRS, Banff, Canada, November 2012.

W. Minvielle,
Summer School on Recent advances in the theory of Homogenization, Chicago - USA, 18th-29th June 2012

W. Minvielle,
Computational Methods for Multiscale Modeling of Materials Defects, IPAM, Los Angeles - USA, 3rd-7th December 2012

F. Nier, Analytic torsion and its applications, Conference organized by J.M. Bismut and W. Müller, Univ. Paris 11, June 2012.

F. Nier, Invitation for three weeks in WIAS-Berlin (Germany), September 2012

F. Nier, Workshop "Mathematics for Semiconductor Heterostructures: Modeling, Analysis, and Numerics", WIAS-Berlin (Germany, September 2012.

F. Nier, Lectures on Semi-classical analysis, Ritsumeikan University (Japan), October 2012.

F. Nier, "Workshop on Spectral Analysis, Stability and Bifurcations in Modern Nonlinear Physical Systems", BIRS Banff (Canada), November 2012.

F. Nier was invited for one week in Tokyo University (Japan), November, 2012.

F. Nier, Paris-London seminar, Inst. Henri Poincaré, Paris (FRANCE), December 2012

M. Rousset, CECAM Workshop "Free energy calculations: From theory to applications", Marne-la- Vallée, June 2012,

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M. Rousset, Workshop "Mathematical and Numerical Analysis of Electronic Structure Models", Beijing, China, June 2012,

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M. Rousset, Evolve Conference, Mexico City, Mexico, August 2012.

M. Rousset, BIRS Workshop "Nonequilibrium Statistical Mechanics: Mathematical Understanding and numerical Simulation", Banff, Canada, November 2012.

G. Stoltz, Workshop "Quantum and Atomistic Modeling of Materials Defects", IPAM, Los Angeles, October 2012,

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G. Stoltz, Workshop "Mathematical and Numerical Analysis of Electronic Structure Models", Beijing, China, June 2012,

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G. Stoltz, CECAM workshop "Free energy calculations: From theory to applications", Marne-la- Vallée, June 2012,

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National conferences communications

A. Alfonsi, Journées MAS, Clermont-Ferrand, Août 2012.

D. Benoit, IWNMNNF, Blois, France, March 2012,

D. Benoit, CANUM, Superbesse, France, May 2012,

D. Benoit, colloquium on numerical modeling of grain-fluid mixtures, Montpellier, France, octob 2012,

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J. Bonelle, workshop on Complex Grids and Fluid Flows, Lyon, April 2012,

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F. Meunier, ROADEF 2012, Angers, 11-13 April 2012

F. Meunier, MOSIM 2012, Bordeaux, 6-8 June 2012

International seminar

A. Alfonsi, weekly probability seminar of University Roma 2, February 2012.

E. Cancès, weekly seminar of the mathematics department, Berkeley University, USA, January 2012,

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V. Ehrlacher, Applied Mathematics/PDE Seminars of University of California of Santa Barbara, Santa Barbara, USA, November 2012.

A. Ern, Texas A&M University, USA, February 2012.

A. Ern, Manchester University, UK, June 2012.

A. Ern, Magdeburg University, Germany, October 2012.

C. Le Bris, Mathematics Seminar, Freie Universität Berlin, May 2012.

C. Le Bris, Scientific and statistical computing seminar University of Chicago, October 2012.

T. Lelièvre, Analysis seminar, MPI Leipzig, April 2012.

T. Lelièvre, Arbeitsbereich Numerik Mathematisches Institut seminar, Uni Tuebingen, May 2012.

R. Monneau, weekly seminar of Chicago University, USA, May 2012.

G. Stoltz, weekly seminar of the mathematics department, University of Edinburgh, United-Kingdom, February 2012,

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National seminar

A. Alfonsi, decision mathematics seminar of the Toulouse School of Economy, February 2012.

A. Alfonsi, random matrices working group of Marne-la-Vallée, March 2012.

A. Alfonsi, Bachelier seminar, Paris, IHP, May 2012.

A. Alfonsi, weekly seminar of the of EM Lyon (school of management), September 2012.

A. Alfonsi, seminar of mathematical finance and numerical probability, Paris 6 University, November 2012.

A. Alfonsi, weekly probability seminar of Evry University, December 2012.

D. Benoit, Colloque Modélisation numérique des mélanges grains-fluides, Montpellier (France), October 2012

E. Cancès, weekly seminar of the mathematics department, Université d'Orsay, January 2012,

E. Cancès, working group on numerical methods, Université Paris 6, January 2012,

E. Cancès, weekly seminar of the mathematics department, ENSTA, March 2012,

J-P. Chancelier,
Google Hack Days: Music Hack Paris
Using scientific languages Nsp and Scicoslab as tools for music generation with Brigitte d'Andréa-Novel, April 2012

J.-F. Delmas, Univ. Angers, November 2012.

V. Ehrlacher, Séminaire d'Analyse numérique - Equations aux dérivées partielles du Laboratoire Paul Painlevé, Lille, France, Mars 2012.

V. Ehrlacher, Groupe de travail EDP et analyse numérique LAMA-CERMICS, Marne-la-Vallée, France, May 2012.

V. Ehrlacher, Séminaire des thésards du laboratoire AGM, Cergy, France, May 2012.

A. Ern, weekly seminar of the mathematics department, University of Toulouse, June 2012.

B. Jourdain, Probability seminar, LPMA, Universities Pierre and Marie Curie and Denis Diderot, March 2012.

B. Jourdain, Probability seminar, University Paris 13, April 2012.

S. Lahbabi, Weekly seminar of the mathematics department, University of Cergy Pontoise, Novem- ber 2012,

T.Lelièvre, Séminaire de mathématiques, Université de Marne-la-Vallée, January 2012.

T. Lelièvre, Séminaire du MAPMO, Orléans, February 2012.

F. Nier, Séminaire Univ. Nantes, January 2012.

F. Nier, Séminaire Univ. Bordeaux, March 2012.

F. Nier, Séminaire de Probabilités, Univ. Rennes 1 (France), November 2012.

G. Stoltz, seminar at Collège de France, June 2012.

SCIENTIFIC ANIMATION

EDITORIAL BOARDS/ACTIVITY

Cancès E. is :
- co-Editor in chief (with P. Del Moral and J.-F. Gerbeau) (2005-) of ESAIM Proc.
- a member of the editorial boards of Mathematical Modelling and Numerical Analysis (2006-) and of SIAM Journal of Scientific Computing (2008-). and of Communications in Mathematical Sciences (2011-).

De Lara M. is :
- associate editor of Environmental Modeling and Assessment (Springer), associate editor (2007-)

Delmas J-F. is :
- a member of the editorial board of Applied Mathematics research express (2010-)

Ern A. is :
- a member of the editorial board of SIAM Journal of Scientific Computing (2011-).

Jourdain B. is :
- a member of the editorial board of ESAIM Proc.
- a member of editorial board of American Journal of Algorithms and Computing

Le Bris C. is :
- co-Editor-in-chief (with A.T. Patera, MIT) (2005-2012) of Mathematical Modeling and Numerical Analysis
- Editor-in-chief of Applied Mathematics Research Express (2003-)
- a member of the editorial boards of Archive for Rational Mechanics and Analysis (2004-), COCV (Control, Optimization and Calculus of Variations) (2003-), Mathematics in Action (2008-), Mathematics Applied in Science and Technology (2006-), Networks and Heterogeneous Media (2005-), Nonlinearity (2005-), Review of Mathematical Science (2006-), Journal de Mathématiques Pures et Appliquées (2009-).
- a member of the editorial board of the monograph series Mathématiques et Applications, Series, Springer (2008-), and Modeling, Simulations and Applications, Series, Springer (2009-).

T. Lelièvre is :
- co-editor in Chief of ESAIM: Proceedings. (2012 -)

R.Monneau is :
- a member of the editorial board of the journal "Interfaces and Free Boundaries" (2012-).

MEMBERS OF SCIENTIFIC COMMITTEES

Cancès E. is :
- a member of the executive committee of the CEA-EDF-INRIA schools in applied mathematics and computer science, and of the scientific committee of the GDR co-DFT.

De Lara M. is :
- President of the scientific committee of the Labex CORAIL (2012-)
- a member of the scientific committee of the Gaspard Monge Program for Optimization and operation research (PGMO), Electricité de France (EDF) and the Jacques Hadamard Mathematical Foundation (FMJH), (2012-)
- a member of the French Economic Council for Sustainable Development (2008-).

Delmas J.-F. is
- President of the scientific committee of the congrés SMAI 2013.

Ern A. is :
- a member of the Scientific Committee of ANDRA (2005-).
- a member of the Scientific Committee of Institut Camille Jordan, Lyon (2012-).

Le Bris C. is :
- a member of the Scientific Program Committee of ICIAM 2011, Vancouver, Canada,
- a member of the scientific board of ENPC, 2008- (nominated as representative of the research scholars),
- a member of the Comité d'experts for the Fondation de Recherche pour l'Aéronautique et l'Espace,
- a member of the Comité d'animation du domaine thématique Mathématiques appliquées, calcul et simulation at INRIA,

- a member of the International Scientific Advisory Committee of the Centre de Recherche Mathématique, Université de Montréal,
- a member of the Advisory Board of the DFG Cluster of Excellence Engineering of Advanced Materials, Erlangen,
- a member of the International Scientific Advisory Board of the DFG research center Matheon, Berlin.
- a member of Conseil de perfectionnement du Master de Mathématiques de l'Université Pierre et Marie Curie.

Lelièvre T. is :
- a member of the scientific committee of the ENUMATH 2013 conference.

Monneau R. is :
- a member of the committee of the Doctoral School MSTIC of Paris Est University.
- a member of the committee of the United Doctoral School of Paris 9è Dauphine University.

Nier F. is :
- a member of the scientific committee of the workshop "Spectral Analysis of Non-Selfadjoint operators", ANR NONAa, CIRM, December 2011,
- a member of the scientific committee of the workshop "Mathematics for semiconductor heterostructure 2012" WIAS-Berlin, September 2012,
- a member of the scientific committee of the CNRS-GDR "Dynamique Quantique" led by S. de Bièvre.

Conference organization

E. Cancès has organized or co-organized :
- a workshop on the mathematics and numerical analysis of electronic structure models, Beijing, China, June 2012,
- a worskhop on quantum and atomistic modeling of materials defects, IPAM-UCLA, Los Angeles, USA, October 2012.

I. Dabo, V. Ehrlacher and G. Stoltz have co-organized a CFCAM meeting on numerical and mathematical problems for solar cell devices, in Paris, France, 5 september 2012.

M. De Lara organized with Stéphane Gaubert (INRIA) the EDF/CEA/INRIA Summer School on Stochastic Optimization, Cadarache, France, June 25 to July 6, 2012

J.-F. Delmas has co-organized the Workshop on Continuum Random Trees and Applications (ANR A3), CIRM Marseilles (France), 3-7 September 2012.

V. Ehrlacher and T. Lelièvre have co-organized a thematic minisymposium on greedy algorithms for high- dimensional problems at AIMS 2012, Orlando, USA, July 2012.

B. Jourdain and A. Sulem have organized the CEA-EDF-INRIA school "Systemic Risk and Quantitative Risk Management », held in Rocquencourt, 15-17 october 2012

T. Lelièvre has co-organized a CECAM workshop "Free energy calculations: From theory to applications" at the Ecole des Ponts, June 4th-8th 2012.

T. Lelièvre : In 2012, three workshops have been organized by the GdR MoMaS:
- Multiscale analysis for electrokinetic models: application to flows in porous media (September 2012, IHP)
- Multiphase flows (October 2012, Nice)
- Innovative schemes and highly performing methods for the numerical simulation of fluid flows (October 2012, Marseille).

G. Stoltz has co-organized the workshop "Nonequilibrium Statistical Mechanics: Mathematical Understanding and Numerical Simulation" held at BIRS, Banff, Canada, November 12-16, 2012.

Seminar organization

A. Alfonsi is co-organizing the seminar on "Stochastic methods and finance" which is common with UPEMLV and INRIA Mathfi project-team.

P. Hoscheit and O. Hénard are co-organizing at ENS Paris with N. Curien a monthly seminar on random trees and their applications on behalf of the ANR A3 project.

Other scientific animation

J-F. Delmas has organized the probability models in biology session teld in the journées MAS, 29-31 august 2012, Clermont-Ferrand.

B. Jourdain has organized the Numerical Probability session teld in the journées MAS, 29-31 august 2012, Clermont-Ferrand.

EDUCATION ACTIVITIES

SUPERVISION ACTIVITY

HdR defended

A. Alfonsi, Discretization of processes and Modeling in Finance, 2012

F. Meunier, Some questions in operations research, transport, and combinatorics. 2012

G. Stoltz, Molecular Simulation: Nonequilibrium and Dynamical Problems, 2012

Theses defended

CHALHOUB Nancy,
A posteriori error estimates for the unsteady advection-diffusion-reaction equation and application to finite volumes, PhD advisors A. Ern and co-dir T. Sayyah, ED MSTIC

CHEMLA Daniel,
Algorithms for optimizing shared mobility systems, PhD advisor F. Meunier, UPE, ED MSTIC.

EHRLACHER Virginie,
Modelisation and simulation of photo-electrical phenomena and Uncertainty quantification in contact problems. PhD advisors: E. Cancès and T. Lelièvre. ED MSTIC

EL KASS Danny,
Atomic to continuum passage for anotubes. A discrete Saint-Venant principle and error estimates, phD advisors M. Jazar and R. Monneau. ED MSTIC

HENARD Olivier,
Genealogy and Q-process, PhD advisor J-F Delmas, ED MSTIC

HOSCHEIT Patrick,
Tree-valued random process, PhD advisors: R. Abraham and J.-F. Delmas, ED MSTIC

JOUBAUD Rémi,
Mathematical and numerical modeling of fluids at nanometric scale, PhD advisors A. Ern and T. Lelièvre, ED MSTIC

ROUSSEAU Marie,
Uncertainties in overland flow and erosion modeling, PhD advisors A. Ern and O. Le Maitre, ED MSTIC

THOMINES Florian,
Multi-scale numerical approaches : Application to homogenization of random materials and discrete-to-continuum coupling methods, PhD advisors: C. Le Bris and F. Legoll. ED MSTIC

Ongoing theses

ALAIS Jean-Christophe,
Risk and optimization for the management of energies, PhD advisor: M. De Lara. ED MSTIC

AL HAJ Mohammad,
Analysis of elasto-visco-platic models including dislocation dynamics modeling, PhD advisors: R. Talhouk, H. Ibrahim and R. Monneau. ED MSTIC

ALRACHID Houssam,
Numerical method in molecular simulation, PhD advisor : T. Lelièvre ED MSTIC

BENOIT David,
Numerical methods for the simulation of non-newtonian
fluids with applications to debris flows. PhD advisors: C. Le Bris and T. Lelièvre. ED MSTIC

BI Hongwei,
Genealogy of stationary non neutral population, PhD advisors: J.-F. Delmas and Z. Li, Beijing Normal Univ.

BLANC Pierre,
Modeling the price impact of limit and market orders.
PhD advisor: A. Alfonsi. ED MSTIC

BONELLE Jérôme,
Compatible discrete operator schemes for elliptic and flow problems, PhD A. Ern. ED MSTIC

CASENAVE Fabien,
Non-parametric uncertainties in aeroacoustics and vibroacoustics problems, PhD A. Ern and T.Lelièvre. ED MSTIC

CHEMAYCEM Ghada,
Analysis and simulation of a model for seawater intrusion, PhD advisors: M. Jazar and R. Monneau, ED MSTIC

COSTESEQUE Guillaume,
Traffic modeling: from microscopic to macroscopic,
PhD advisors: J.-P. Lebacque and R. Monneau, ED MSTIC

INFANTE ACEVEDO José
« Numerical methods for liquidity risk and pricing »
PhD advisors: A. Alfonsi and T. Lelièvre. ED MSTIC

GONTIER David,
Mathematical modelisation of magnetism at the atomic scale, PhD advisor E. Cancès, ED MSTIC

LAHBABI Salma,
Mathematical study of quatum material with random defaults,
PhD advisors: E. Cancès and M. Lewin. ED EM2C

LECLERE Vincent,
Risk, optimization, large systems, ED MSTIC. PhD advisor: M. De Lara. ED MSTIC

LE GUILCHER Arnaud,
Front propagation methods and applications,
PhD advisors: A. Chambolle and R. Monneau. ED MSTIC

LUSSO Christelle,
Effective vertical velocity profiles
in gravitational flows, PhD advisors F. Bouchut and A. Ern, ED MSTIC

MINT MOUSTAPHA Jyda,
Study and characterization of vehicles platoon on heavy traffic roads, PhD advisors B. Jourdain and D. Daucher. ED MSTIC

MINVIELLE William, numerical methods for materials, started october 1st, 2012, PhD advisors C. Le Bris and F. Legoll, ED MSTIC.

MOURAD Nahia, A mathematical and numerical analysis of the pseudopotential method, PhD advisors E. Cancès, A. Kashmar and A. Mourad, ED MSTIC

PALIDA Ernesto, PhD advisor : B. Lapeyre, ED MSTIC

PASZKOWSKI Lukas,

Analytic and numerical study of dislocation dynamics,
PhD advisors: P. Biler and R. Monneau

PRADEAU Thomas,
Study of the Nash equilibria in multiclass congestion games, Phd advisor F. Meunier, ED MSTIC

PUSCAS Adela,
Immersed boundary methods for 3D fluid-structure interaction, Phd advisor. A. Ern, ED MSTIC

REGNIER Esther,
Fishery economics, a key science for improving the management of halieutic resources, Phd advisors : K. Schubert and M.De Lara

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REY Clément,
Weak error analysis of discretization schemes for some financial processes
PhD advisors: A. Alfonsi and V. Bally. ED MSTIC

REYGNER Julien,
Large deviations of the current in some aerogel models, PhD advisors: L. Zambotti and B. Jourdain. ED MSTIC

SARRABEZOLLES Pauline,
Colorful linear programming
PhD advisor: F. Meunier, ED MSTIC

SEPULVEDA Liliana-Sophia,
Mathematical viability methods for supervision and control of
endemic diseases of south-west Colombia.
PhD advisors: M. De Lara and O. Vasilieva (Univ. del Valle, Cali, Colombia). ED MSTIC

SMADI Charline,
Population extinction in random environnment and genetic hitchhikking, PhD advisors: JF Delmas and S. Méléard, ED MSTIC

TEACHING ACTIVITIES

Courses at ENPC

A. Alfonsi, T. Lelièvre : Modelling, Programming and simulating, second year.

D. Benoit, Formation au logiciel scientifique SCILAB tutorial, Ecole des Ponts ParisTech, first year.

E. Cancès, (professor in charge), V. Ehrlacher, L. Monasse, R. Monneau, G. Stoltz, Analysis, first year.

E. Cancès, (professor in charge), V. Ehracher, L. Monasse, R. Monneau, F. Casenave (2 replacements)
Analysis, first year.

F. Casenave, A. Ern (professor in charge), **G. Stoltz,**
Scientific Computing, first year

J-P. Chancelier, (professor)
Optimization and control, 2nd year

J-P. Chancelier, (professor)
Hazard Modelling, 2nd year

J-P. Chancelier, **M. De Lara**, (professor in charge)
Training in Scientific software Scicoslab.

J.-F Delmas (professor), **B. Jourdain** (professor), Jump processes with applications to energy markets, 3rd year

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I. Dabo, R. Joubaud, C. Lusso,
Linux / Emacs / Scilab / Latex (First Year)

I. Dabo, G. Stoltz (prof in charge),
Statistical and quantum physics projects

M. De Lara, (professor),
Modelling for the Sustainable Management of Natural Resources

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M. De Lara, (professor),
Economics of Risk, Climate Change and Biodiversity

M. De Lara, (professor) Mastère Spécialisé Action Publique, semaine territorialisation des politiques publiques, 11 September 2012

O. Hénard, B. Jourdain (professor in charge) , **J. Reygner, M. Rousset**
Probability theory and statistics, first year

B. Jourdain, B. Lapeyre, (professors)
Monte-Carlo methods in finance, 3rd year ENPC and Master Recherche Mathématiques et Application, university Paris-Est Marne-la-Vallée

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T. Lelievre, (professor),
Deterministic methods in mathematical finance. 3rd year ENPC and Master Recherche Mathématiques et Application, university Paris-Est Marne-la-Vallée

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F. Meunier, (professor), 2nd year,
Operational research.

G. Stoltz (professor),
Computational Statistical Physics, Master SMCD, Ecole des Ponts ParisTech

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G. Stoltz (professor),
Spectral Theory of Schrodinger Operators, Master 2 Mathematics and application, UPEMLV

Courses at UPE

A. Alfonsi,
Data analysis in finance : statistical approach, calibration, Master MAF, UPEMLV

A. Alfonsi,
Risk measure in finance, ENPC, Master MAF, and Master finance UPMC.

I. Dabo,
Introduction to scientific computing,
ED MSTIC, UPE

C. Lusso,
Algebra, L1 Mathematics, UPEMLV

C. Lusso,
Algebra, L2 Physic, UPEMLV

C. Lusso
1A – Engineering, ESIEE

Courses at Paris Tech

A. Alfonsi (professor),
ENSTA: Calibration, stochastic and local volatility.

D. Benoit, F. Casenave, W. Minvielle, G. Stoltz,
Introduction to Scientific Computing, Ecole des Mines ParisTech

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E. Cancès,
Professeur chargé de cours at l'École Polytechnique (Numerical analysis and optimization)

M. De Lara, responsible of the Network optimization course, Master 2 Renewable Energy Science and Technology, ParisTech

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J.-F. Delmas, (professor), **C. Smadi, O. Hénard, V. Leclere,**
Professeur chargé de cours at l'École Polytechnique
(Random walk, Introduction to probability and simulation)

J.-F. Delmas, (professor) Introduction to Probability and Statistics (ENSTA, 1A)

A. Ern,
Professeur chargé de cours at l'Ecole Polytechnique (Numerical analysis and optimization)

B. Jourdain,
Professeur chargé de cours at l'Ecole Polytechnique (Introduction to probability theory, Stochastic numerical methods, projects in finance)

J. Tryoen,
Supervisor for FreeFem++ projects for the "Finite Element" course, ENSMP S3733/5, MINES ParisTech

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Other courses

D. Benoit et I. Dabo,
Informatique, 50h, L2, CPGE Jean-Baptiste Say.

E. Cancès, Mathematical methods in quantum chemistry, M2, University Paris 6.

J.-P. Chancelier, EDF/CEA/INRIA Summer School on Stochastic Optimization, Cadarache, France, June 25 to July 6, 2012

R. Costaouec,

Linear optimization and convexity, L3, Université Paris 6.

M. De Lara,
"Mathematical Models for the Sustainable Management of Natural Resources", Master EDDEE (Economie du Développement Durable, de l'Environnement et de l'Energie)

M. De Lara,
"Mathematical Models for the Sustainable Management of Natural Resources", Master Mathématiques, Informatique et Applications

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M. De Lara,
"Mathematics, Economics and Risk Psychology", Master Ingénierie du Risque : Finance et Assurances (IRFA)

M. De Lara, Stochastic control course, UNI, Lima, Peru, January 2012

M. De Lara, Stochastic control course, Maestria en Matematicas Aplicadas, Pontificia Universidad Catolica del Peru, Lima, Peru, January 2012

M. De Lara, Optimization and viability under uncertainty. Application to renewable energies management, Universidad del Valle, Cali, Colombia, March 2012

M. De Lara, Optimization and viability under uncertainty. Application to renewable energies management, Universidad de Pereira, Colombia, March 2012

M. De Lara, Optimization and viability under uncertainty. Application to renewable energies management, Universidad de los Andes, Bogota, Colombia, March 2012

M. De Lara, Dynamic optimization , Master in Applied Mathematics, Universidad EAFIT, Medellin, Colombia, June and December 2012

M. De Lara, Optimization and viability methods for the sustainable management of natural resources, Department of Electrical Engineering and Electronics, Universidad de los Andes, Bogota, Colombia, July 2012

M. De Lara, Dynamic Programming, IMCA, Lima, Peru, November 2012

J.-F Delmas (professor), **B. Jourdain** (professor), Jump processes with applications to energy markets, Master Recherche Mathématiques et Application, University Paris-Est Marne-la-Vallée

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A. Ern,
Discontinuous Galerkin methods, M2R ANEDP, UPMC.

R. Joubaud,
Vector analysis, UPMC

S. Lahbabi,
Formation "C2i" (Certificat Informatique et Internet), L2, University of Cergy Pontoise, France

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S.Lahbabi,
Probabilities for biologists, 2nd year
University of Cergy Pontoise

S.Lahbabi,
Analysis, 1st year international class
University of Cergy Pontoise

S . Lahbabi,
Licence: Analyse, L1, Université de Cergy Pontoise,

T. Lelievre, (professor),
Deterministic methods in mathematical finance. Master Recherche Mathématiques et Application, university Paris-Est Marne-la-Vallée

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C. Le Bris, Graduate course, 'Mathematical introduction to complex fluids modeling', The Univer- sity of Chicago, 24 hours, October-November 2012.

T. Lelièvre,
Stochastic numerical methods, M2 Mathématiques et Applications, Master UPMC

C. Lusso,
Vector calculus, L1 Maths-Info, Université UPMC

C. Lusso,
Numerical analysis and optimization, 3A, ESIEE-Engineering

F. Meunier,
Master MPRO: Optimization in graphs
Conservatoire des Arts et Métiers

F. Meunier,
Master OJME: Topological combinatorics, UPMC

R. Monneau, July 3-15, 6 lectures at East Chinese Normal University, Shanghai, China.

R.Monneau,
2 weeks in January, 10 lectures at the Lebanese University of Beyrouth, Lebanon.

INDUSTRIAL PARTNERSHIPS

CONTRACTS

New industrial contracts

A. Alfonsi, B. Jourdain, B. Lapeyre
The chair "Financial Risks" Fondation du Risque, has been renewed for a five years period. The partnership now involves UPMC together with the bank Société Générale, the École Polytechnique and the ENPC that took part to the first edition.

E. Cancès, V. Ehrlacher and T. Lelièvre
Greedy algorithms and uncertainty propagation in mechanics, Michelin

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E. Cancès, I. Dabo, V. Ehrlacher and T. Lelièvre
Modelling of photovoltaic devices, IRDEP

M. De Lara : Optimization methods for the smart grids, French Council for Energy (member of the World Energy Council)

M. De Lara : Optimized management of dams under uncertainty, SETEC Energy Solutions

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J.-F. Delmas, Copulas under constraints, EDF

ongoing industrial contracts

A. Alfonsi, B. Lapeyre: OSEO-Eurostars grant (2011-2012). In collaboration with Pricing Partners.

M. De Lara : J.-C. Alais PhD thesis supervision, Electricité de France R&D

A. Ern and T. Lelièvre,
Non-parametric uncertainties in aeroacoustics and vibroacoustics problems, EADS

A. Ern, T. Lelièvre and G. Stoltz,
Multiscale modeling of clays, ANDRA

A. Ern, L. Monasse, R. Monneau,
Shock wave/solid interaction in 3D, CEA/DAM

A. Ern,
Compatible discrete operators, EDF

C. Le Bris,
multiscale simulations of random materials, Office of Naval Research and European Office of Aerospace Research and Development

VALORIZATION SOFTWARE

Valorization software

- SCCS
(http://qe-forge.org/projects/electroemb/).
The objective of the project is to develop computational tools for the description of quantum systems in aqueous environments..

Participants
O. Andreussi, I. Dabo, N. Bonnet, N. Marzari

- ODDFT
(http://qe-forge.org/projects/nkc/).
This project is aimed to the development and testing of novel electronic structure methods.

Participants
I. Dabo and A. Ferretti

- Quantum-Espresso

P. GIANNOZZI, S. BARONI, N. BONINI, M. CALANDRA, R. CAR , C. CAVAZZONI, D. CERESOLI, G. L CHIAROTTI; M. COCOCCIONI, I. DABO, A. DAL CORSO, S. FABRIS, G. FRATESI, S. DE CIRONONCOLI, R. GEBAUER, U. GOUGOUSSIS, A. KOKALI, M. LAZZERI, L. MARTIN-SAMOS, N. MARZARI, F. MAURI, R. MAZZARELLO, S. PAOLINI, A. PASQUARELLO, L. PAULATTO, C. SBRACCIA, S. SCANDOLO, G. SCLAUZERO, A. P. SEITSONEN, A. SMOGUNOV, P. UMARI, R. M. WENTZCOVITCH

Software for quantum simulations of materials Personal contributions: development of electrostatic solvers, development of solvation models, development of quantum-mechanical calculation methods. Contact:q-e-developers@qe-forge.org

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- OADLIB;
http://cermics.enpc.fr/~meuniefr/OADLIBSim_Site/; a simulator for self-service transport system, allowing easy implementation of new operation strategies.

Participants:
D. Chemla
F. Meunier
H. Yahiaoui

Nsp, J-PH . CHANCELIER, B. PINCON
http://cermics.enpc.fr/~jpc/nsp-tiddly/mine.html

Scicoslab version 4.4.1
J.P. Chancelier

PREMIA (13th version); Premia is a software designed for option pricing, hedging and financial model calibration. The development of increasingly complex financial products requires the use of advanced stochastic and numerical analysis techniques. A consortium of banks have been using Premia since it's beginning in 1999 and have brought important contributions to the project. (2011-2014)

Participants : A. Alfonsi, B. Jourdain, B. Lapeyre, J. Sulem, Lamberton, Bally, Zanette.
https://www.rocq.inria.fr/mathfi/Premia/index.html

PUBLIC PROGRAMS SUPPORT

New public contracts

ANR BECASIM, which is concerned with the numerical simulation of Bose-Einstein condensates. This ANR is coordinated by I. Danaila (Université de Rouen).It involves E. Cancès (2012- 2016).

ANR CriMin (Crystal-chemistry of iron-bearing minerals and implications in the geochemical cycling of metal pollutants). This ANR is coordinated by M. Blanchard, Institut de Minéralogie de Physique des Milieux Condensés, UPMC. It involves I. Dabo (2012-2015).

ANR-HJ Net: Hamilton-Jacobi equations on heterogeneous structures and networks, head: O. Ley.
Partner teams: Tours Univ. (G. Barles), Rennes Univ. (O. Ley), Paris 7 Univ. (Y. Achdou), CERMICS (R. Monneau).
(2012-2016).

ANR-LODIQUAS led by F. Castella (Rennes) and N. Mauser (Wien). It involves F. Nier. (2012-2016).

ANR-NOSEVOL led by F. Hérau (Nantes) T. Ramond (Orsay) and S. Vu- Ngoc (Rennes), it involves F. Nier (2012-2015).

ANR PANELS (Photovoltaics from Ab-initio Novel Electronic-structure Simulations).The PANELS initiative gathers three groups (CNRS, Institut Neel, France; Université de Lyon, LPMCN, France; Ecole des Ponts, Université Paris-Est, CERMICS, France) expert in methodology developments around many-body perturbation theory and a novel orbital-dependent density functional formalism, in order to study the electronic, optical and transport properties of second/third generation photovoltaic devices. It involves I. Dabo (2012- 2015).

ANR Stab It focuses on the long-time behaviour of PDEs and Stochastic processes and their time-discretization. It involves B. Jourdain and T. Lelièvre at CERMICS.
Head : I. Gentil (univ. Lyon 1).
(2012-2015)

M. De Lara, Web portal and electronic courses in stochastic optimization (POCEOS), Gaspard Monge Program for Optimization and operation research (PGMO), (2012-2013)

M. De Lara, Human spatial behaviour, biodiversity and ecosystem services, participation to Exploratory Project (PEPS), CNRS

CEDRE 11 E F45/L20: french-lebanese project on "Study of front propagation of freshwater and saltwater in lebanese coastal aquifers" (Régis Monneau)
(2012-2013)

Ongoing public contracts

The ANR BIGMC Monte-Carlo methods for high-dimensional problems, with typical applications in financial mathematics, Bayesian statistics, and computational statistical physics.
Partners : TELECOM, University Paris Dauphine, and CERMICS / B. Jourdain and T. Lelièvre. Head : G. Fort (TELECOM). (2009-2012)

ANR-08-BLAN-0190 A3 (Random trees and applications), Parteners: Univ. Nancy, Univ. Orléans and Univ. Bordeaux. Head: J.-F. Delmas. (2009-2012)

ANR MANIF focuses on the mathematical and numerical analysis of electronic structure models, such as, in particular, the Kohn-Sham model. It includes two research teams: researchers from the JL Lions Laboratory (UPMC) and the Micmac team.
Head : E. Cancès. (2011- 2014)

ANR MEGAS (methods for numerical simulation, with an emphasis on sampling methods). Parteners : the INRIA project IPSO in Rennes, the INRIA project SIMPAF in Lille, the eDAM team in Nancy (chemistry).
Head :T. Lelièvre. (2009-2012)

ANR MODUM: this project aims to mutualise urban logistics. But instead of facilitating the matching between demand and offer, the project studies the opportunity of introducing a unique operator, whose mission would be the management of urban logistics.
Head : F. Meunier. (2009-2014)

ANR POSAMU: This project aims to optimize the location and the dispatching of emergency vehicles (SAMU-SMUR in the french terminology) in Val-de-Marne. It concerns strategic as well as real-time decisions.
Head : F. Meunier. (2012-2013)

ANR "SImulation of chemical REactivity at interfaces", SIRE, scientist in charge Ph. Sautet, ENS Lyon for the simulation of chemical reactivity at interfaces.

BRGM : Partial PhD fellowship from BRGM on infiltration and erosion stochastic modeling, A. Ern.

CENTRAL OO project : This project aims to develop tools for operating a fleet of electric taxis optimally. The main difficulty in the real-time management is to deal with the recharge. The locations of the recharge terminals or the right size of the fleet are also addressed.
(F. Meunier is member of IdF region)
(2011-2013)

FUI LUMD : is based on the following observation: in an urban context, many trips are made with almost empty vehicles, many warehouses have not fully exploited storage capacities and intermodal exchanges are rare. The project aims to exploit these real opportunities for optimizing and mutualizing urban logistics. It will facilitate the matching between demand and logistic offer. The spin-offs will be economic, ecological and urbanistic. F. Meunier is member of project.
(2009-2012)

GASPARD MONGE Program for Optimization and operation research (PGMO) : Colourful Linear Programming.
Head : F. Meunier
(2012-2013)

GDR-CNRS Quantum dynamics: This interdisciplinary research network is focused on physical and mathematical problems related to the time evolution of quantum systems (transport problems, nonequilibrium systems, etc) S. De Bièvre (Univ. Lille 1). It involves F. Niers.
(2009-2013)

GNR MOMAS on Mathematical modeling for radioactive waste storage.
Head : T. Lelièvre
Scientific advisor : A. Ern

OVIMINE, Optimization and viability in mining, STIC-AmSud project (CNRS, INRIA, French Ministry of Foreign Affairs) with Peru and Chile. M. De Lara
(2011-2012)

Partner of Projet P (FUI Oséo project). The aim of this project is to help code generation for embedded systems from high level languages, Partener :J.-Ph. Chancelier
(2012-2015)

R2DS OADLIB: This project aims to study the algorithmic questions arising when trying to operate self service transport systems optimally. These questions concern the strategic level of decision as well as the real-time one.
Head : F. Meunier
(2009-2012)

ACRONYMS

AERES	**Agence d'évaluation de la recherche et de l'enseignement supérieur**
ANDRA	**Agence Nationale pour la gestion des Déchets Radioactifs**
ANR	**Agence Nationale de la Recherche**
BRGM	**Bureau des Recherches Géologiques et Minières**
CEA	**Commissariat à l'Energie Atomique**
CETMEF	**Centre d'Etudes Techniques Maritimes et Fluviales**
CNES	**Centre National des Etudes Spatiales**
CNRS	**Centre National de la Recherche Scientifique**
CNRSL	**Centre National de la Recherche Scientifique du Liban**
CIFRE	**Convention Industrielle de Formation par la Recherche**
DRAST	**Direction de la Recherche et des Affaires scientifiques et Techniques**
EADS	**European Aeronautic Defense and Space Company**
EDF	**Electricité de France**
ED MSTIC	**L'École Doctorale Mathématiques et Sciences et Technologies de l'Information et de la Communication**
ENSTA	**Ecole Normale Supérieure de Techniques Avancées**
ESPCI	**École Supérieure de Physique et Chimie Industrielles**
GNR	**Groupement National de Recherches sur la MOdélisation MAthématique**
IFP	**Institut Français du Pétrole**
IFSTTAR	**Institut Institut français des sciences et technologies des transports, de l'aménagement et des réseaux**
INRIA	**Institut National de Recherche en Informatique et Automatique**
INSERM	**Institut Nationale de la Santé et de la Recherche Médicale**
IRSN	**Institut de Radioprotection et de Sûreté Nucléaire**
LCPC	**Laboratoire Central des Ponts et Chaussées**
LIMSI	**Laboratoire *d'Informatique pour la Mécanique et les Sciences de l'Ingénieur***
MOMAS	**et les Simulations numériques liées à la gestion des déchets nucléaires**
ONERA	**Office National d'Etudes et Recherches Aérospatiales**
SMAI	**Société de Mathématiques Appliquées et Industrielles**
UPE	**Université Paris-Est**
UPEMLV	**Université Paris-Est Marne-La-Vallée**
UPMC	**Université Pierre et Marie Curie (Paris VI)**