CERMICS

mathématiques – informatique

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

14 Researchers
4 Associate researchers
21 External collaborators
24 PhD students
2 Administrative assistants
14 Post-docs
13 Invited researchers
20 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.

Three teams deal with modelling and scientific computing: the "Fluid Dynamics" team (leader: Alexandre Ern), which develops advanced numerical finite element methods applied to environmental flows and solids mechanics, 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), system simulation, and control, 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 MATHFI (leader: Agnès Sulem).

KEY FACTS

Staff changes, missions, visits

Ismaila Dabo joined CERMICS as a researcher since September 1st, 2009. He completed his PhD at MIT, under the supervision of Nicola Marzari, and defended his thesis in October 2007. He then did a post-doc at INRIA. His scientific activities concentrate on quantum-mechanical models in computational materials science applied to electrochemical and photovoltaic convertors (e.g., fuel cells and solar cells).

Alexandre Ern took the position of Deputy-director of CERMICS.

Éric Cancès was invited for two months at Brown University (Providence, USA) and Claude Le Bris completed his one year invitation from the University of Minnesota (School of Mathematics and IMA).

The Molecular and Multiscale Simulations team hosted Professor Stefano Olla thanks to the INRIA project MICMAC. The Applied Probability team hosted Professor Francesco Russo (part-time with INRIA) and his PhD students during his second sabbatical year in the MathFi project. Professor Igor Mozolevski from Federal University of Santa Catarina (Brasil) terminated his sabbatical year in the Fluid Dynamics team.

In 2009, CERMICS received 14 post-doctoral students and had 22 PhD students, among them 5 defended their PhD in 2009.

The Molecular and Multiscale Simulations team co-organized a workshop on numerical methods in rheology in January. The Applied Probability team organized the Third Conference on Numerical Methods in Finance with the financial support of the chair « Measure of Financial Risks » in April. The Fluid Dynamics team organized the GNR MOMAS Biennal Conference in November 2009.

Publications and prizes

The CERMICS laboratory has sustained a high scientific activity: more than fifty articles have been published in international refereed journals (and over twenty more have been accepted for publication). Also more than sixty presentations in conferences have been made and 8 conferences or workshops Industrial impact **have been organized by members of CERMICS.**

The books «Probabilités et statistiques» by Benjamin Jourdain and «Towards First-principles Electrochemistry» by Ismaila Dabo have been published.

Claude Le Bris has been awarded the Aisenstadt Chair for 2009-2010 from the University of Montréal and has delivered a series of lectures at this occasion.

Eric Cancès has been awarded the Blaise Pascal Prize 2009 from SMAI and French Academy of Sciences.

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 (CNES, CEA, Creditnext, EADS, EDF, IFP, Rio Tinto, (formerly Pechiney and then Alcan), Société Générale, Thalès-Alenia Space, US Air Force, US Navy, etc). Nine programs, which represent a significant part of our financial support, are granted by the «Agence Nationale de la Recherche» (ANR). The level of research contracts was very high in 2009, about 550 k€ for contracts signed by École des Ponts ParisTech.

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 partnership with the 2nd year Master program on Applied Mathematics and Mathematical Finance of UPEMLV, and the 2nd year Master program on Numerical Analysis and PDES of University Pierre and Marie Curie (Paris VI).

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 Applied Probability team organized the Third Conference on Numerical Methods in Finance from 15 to 17 April 2009 at École des Ponts ParisTech with the financial support of the chair "Measure of Financial Risks". There were 120 participants from all over the world.

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 2009, Mohamed Sbai and Arno Siri-Jégousse have defended their PhDs, and four students have started new PhDs.

Concerning mathematical finance, the team is part of the Mathfi project together with researchers from the UPEMLV and the INRIA and also takes part in the chair "Measure of Financial Risks" of the Risk Foundation together with the École Polytechnique and the Société Générale. In addition to the partnership with banks structured by the consortium supporting the development of the pricing, hedging and calibration library of numerical routines called Premia, the team takes advantage of contracts with Credinext and Eurostars to finance PhDs and postdocs. Concerning teaching, the team is strongly involved in the Master program in mathematical finance at UPEMLV-ENPC.

In continuation of the project ADAP'MC, the ANR project Big'MC started in 2009. It is aimed at collaborations with the statisticians from the ENST and the University Paris Dauphine to enhance Monte Carlo methods in high dimension especially with adaptive variance reduction techniques.

The team hosts the ANR program A3 on Random Trees and Applications which focuses on branching processes. This activity is also connected to applications in biology.

J.-F. Delmas is currently head of the SMAI-MAS group, which has launched in 2009 the first edition of the J. Neveu thesis prize in probability and statistics.

2. Fluid dynamics

The Fluid Dynamics team develops advanced numerical methods for environmental flows and solids in interaction. The main applications are underground waste storage, hydraulics, hydrology, fluid-structure interaction, contact problems, and crack propagation. Scientific activities cover physical modelling, numerical analysis, and simulation. A specific expertise concerns Discontinuous Galerkin methods and a posteriori error estimates. Parametric uncertainty propagation is a new emerging topic, in particular stochastic Galerkin methods and applications to overland flows and erosion. Another new topic is multiscale modeling of clays. All these activities are developed in partnership and most of them involve a PhD thesis.

Ern organized the GNR MOMAS Biennal Conference in November 2009.

4 ongoing Ph.D. theses and 2 new ones started in 2009.

I. Mozolevski (UFSC, Brasil) terminated his one-year sabbatical visit in March 2009.

P. Tassi terminated his post-doc in November 2009.

3. Molecular and multiscale simulations

The scientific focus of the team 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: providing the models with a sound mathematical grounding, and improving the numerical approaches.

More precisely, the main topics covered by the team are the following (mentioning only the permanent members working on each subject):

- computational quantum chemistry and approximation of the Schrödinger

problem (E. Cancès, I. Dabo, C. Le Bris and G. Stoltz)

- molecular dynamics and computational statistical physics (C. Le Bris, T. Lelièvre and G. Stoltz)

- free surface flow (C. Le Bris and T. Lelièvre)

- micro-macro models for fluids (C. Le Bris and T. Lelièvre)
- micro-macro models for solids

and stochastic homogenization (C. Le Bris)

- quantum models for electrochemistry (I. Dabo)

Let us also mention an emerging activity on uncertainty propagation and applications of greedy algorithms (E. Cancès, C. Le Bris and T. Lelièvre).

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.

The main directions which are followed by the team for the forthcoming years are:

- taking into account defects in periodic electronic structures (crystals, nanotubes, ...)

- accurately computing dynamical quantities in molecular dynamics

- understanding how to coarse-grain a dynamics

- understanding out-of-equilibrium statistical physics

- the modelling of granular materials

- the modelling of electronic components used in photovoltaic devices

The team has (co-)organized the following events:

- C. Le Bris and T. Lelièvre have co-organized a workshop on numerical methods in rheology, Ecole des Ponts

ParisTech, January 2009.

hrttp://cermics.enpc.fr/lelievre/Workshop_Complex_Fluid/workshop.html.

- E. Cancès has co-organized the following events in 2009:

* the Workshop on continuum modelling of biomolecules (Beijing, Sept. 14-17, 2009), and

* with F. Legoll, a mini-symposium on Numerical methods and their applications in molecular simulation, ICNAAM 2009 conference, Greece (Rethymno, Crete), September 18-22, 2009.

Some members of the team have been invited for stays in institutions abroad:

- E. Cancès, Brown University, Providence, USA, July-August 2009.

- C. Le Bris, University of Minnesota, IMA, Minneapolis, USA, during the academic year 2008-2009.

- S. Olla, Technical University of Budapest, Hungary, within the project of French-Hungary collaboration ''Balaton'', November 2009.

C. Le Bris has been

- a member of the organizing committee of the IMA thematic year Mathematics and Chemistry, Minneapolis 2008-2009,

- a Distinguished Ordway Visitor 2008-2009, School of Mathematics, University of Minnesota.

- awarded the Aisenstadt Chair 2009-2010 from the University of Montréal and has delivered a series of lectures there, in October 2009.

E. Cancès has been awarded the

Blaise Pascal Prize 2009 from SMAI and the French Academy of Sciences.

4. Optimization and systems

Numerical methods in stochastic control. In his ongoing PhD work, P. Girardeau completed an experimental comparison of two discretization methods of stochastic optimal control problems, namely the scenario tree and the particle approaches. The comparison criterion is the decrease of the mean quadratic error of the approximate feedback solution when the number of Monte Carlo samples increases. It has been confirmed that the scenario tree method is highly sensitive to the horizon length of the problem whereas the particle method is not.

Risk management and probability constraints. The ongoing collaboration with Thalès-Alenia-Space and CNES for planning space vehicle trajectories taking into account the risk of engine failures has made progress

towards handling more and more realistic dynamic models.

Transport. In the simulation study of collective taxis (PhD of E. Lioris), the simulator has reached an operational stage that allowed us to thoroughly investigate optimization of real-time management policies and optimal system sizing (number of taxis in service, taxi passenger capacity, etc.), at least without central dispatching.

Mathematical methods for sustainable management of natural ressources. This topic is driven by M. De Lara. The main activity in 2009 has been the scientific animation of the last year of the network MIFIMA (Mathematics, Informatics and Fisheries Management), a Stic-AmSud project between Chile, France and Peru.

Scientific software. This topic is driven by J.-P. Chancelier. NSP has continued to evolve by adding primitives and toolboxes in collaboration with Bruno Pinçon.

1 year and 3 years projects :

- Lauching of two new international projects on management of natural resources (mining STIC-AmSud, epidemiology Ecos-Nord).

- Optimization chair on optimization with EDF and industrial partners.

- Contract and PhD supervision (Jean-Christophe Alais) with EDF on management of electricity production under risk constraints.

- PhD co-supervision (Esther Regnier) on stochastic viability methods for fisheries management with University Paris 1.

5. PDE and materials

The main subject studied by the PDE and Materials team is the dynamics of dislocation. 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 (with INRETS laboratory), and we also have collaboration projects with the LAMA laboratory.

STAFF

Researchers (14)

ALFONSI Aurélien, Applied Probability team, Ecole des Ponts ParisTech, research scientist
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
COHEN Guy, Optimization and Systems team, Ecole des Ponts ParisTech, research scientist, HdR
DABO Ismaila, Molecular and Multiscale Simulations team, research scientist, temporary position at Inria until August 2009 then research scientist at Ecole des Ponts ParisTech from September 2009
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
MONNEAU Régis, PDE and Materials team, Ecole des Ponts ParisTech, research scientist, HdR
STOLTZ Gabriel, Molecular and Multiscale Simulations team, Ecole des Ponts ParisTech, research scientist

Associated researchers (4)

BOULEAU Nicolas, Applied Probability team, Ecole des Ponts ParisTech, research scientist, HdR
EL HAJJ Ahmad, PDE and Materials team, University of Compiègne, Assistant professor
IMBERT Cyril, PDE and Materials team, University Dauphine, Assistant professor, HdR
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BARTY Kengy, Optimization and systems, Research, EDF
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ROUY Elisabeth, PDE and Materials, Ecole Centrale Lyon, Research, HdR
VOHRALIK Martin, Fluid dynamics, LJLL, UPMC-CNRS

Invited Researchers (13)

BOUDJERADA Rachida, PDE and Materials, Boumediene University, Algeria, PhD student, 1 month
BURMAN Erik, Fluid dynamics, University of Sussex - UK, Professor, 1 month
EFENDIEV Messoud, PDE and Materials, Professor, 1 month
FINO Ahmad, PDE and Materials, Libanese University, PhD student, 1 month
FAOUR Houda, PDE and Materials, Libanese University, PhD student, 1 month
MOZOLEVSKI Igor, Fluid dynamics, UFSC Florianopolis - Brasil, 3 months
OLLA Stefano, Molecular and multiscale simulations, Invited Professor, “in delegation” at INRIA, University of Paris Dauphine, since October 2009, HdR
PATRIZI Stefania, PDE and Materials, University of Cagliari, Italia Professor
RUSSO Francesco, Applied Probability, Invited Professor, “in delegation” at INRIA, University of Villetaneuse, since October 2008
SCOTTI Simone, Applied Probability, EPLF Lausanne
SUZUKI Atsushi, Molecular and multiscale simulations, INRIA, Invited Professor, since October 2009, HdR
VASQUES-ABAD Felisa, Optimization and systems, 1 month
ZANETTE Antonino, Applied Probability, 2 months

Post-doctoral students (14)

AMOR Hanen, Molecular and Multiscale Simulations team, Post doctoral fellow, Financed by ANR, from September 2008 until August 2009
DABO Ismaila, Molecular and Multiscale Simulations team, Post doctoral, from September 2008 until August 2009
CACACE Simone, PDE and Materials team, enpc, post-doctoral student, from January until November
DICKSON Bradley, Molecular and Multiscale Simulations team, Post doctoral fellow, Financed by ANR, from February 2009
DOBSON Matthew, Molecular and Multiscale Simulations team, Post doctoral fellow, Financed by NSF, from September 2009
GUIBERT David, Molecular and Multiscale Simulations team, “chargé de recherche” Financed by ANR, from November 2009
HAMDI Mustapha, Molecular and Multiscale Simulations team, Post doctoral fellow, Financed by INRIA, from October 2009
KILANI Moez, Optimization and Systems team, Ecole des Ponts ParisTech, post-doctoral student, Financed by Région IDF, from January 2008 until August 2009
LI Yanli, Molecular and Multiscale Simulations team, Post doctoral fellow, Financed by ANR, from January 2008
LINDGREN Erik, PDE and Materials team, Ecole Polytechnique and Ecole des Ponts ParisTech, post-doctoral student, from September 2009
POMMIER David, Molecular and Multiscale Simulations team, Post doctoral fellow, Financed by ANR, from October 2009
SABERI FATHI Seyed Majid, Molecular and Multiscale Simulations team, Financed by ANR, from September until november
SABINO Piergiacomo, Applied Probability team, Ecole des Ponts ParisTech, post-doctoral student, Financed by Risk Foundation, from January until June
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Ph. D Students (24)

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FAOUR Houda, PDE and Materials team, PhD student, ENPC and CNRS Liban fellowship, ED ICMS until 31 March
GALICHER Hervé, Molecular and Multiscale Simulations team, PhD student, University Paris 6
GIRARDEAU Pierre, Optimization and Systems team, PhD student, ED MSTIC, CIFRE/EDF,
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, UPE fellowship, ED MSTIC
JEUNESSE Maxence, Applied Probability team, PhD student, ENPC fellowship, ED MSTIC
JOUBAUD Rémi, Fluid dynamics team, PhD student, ANDRA fellowship, ED MISTIC
LIORIS Eugénie, Optimization and Systems team, PhD student, ED MSTIC, INRIA fellowship
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TRYOEN Julie, Fluid Dynamics team, PhD student, ENPC fellowship, ED MSTIC

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BALMA Ismail, PDE and Materials,
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CARRA Damien, PDE and Materials,
DARDEL Vincent, Molecular and multiscale simulations
DURMUS Alain, PDE and Materials,
FRONTERE Noémie, PDE and Materials,
GRUNINGER Christoph, Fluid dynamics, University of Stuttgart (Germany)
HENARD Olivier, Applied Probability Team
JOUBAUD Rémi, Fluid dynamics
KOOKHAN Mohamad Reza, Molecular and multiscale simulations
LAGRAVE Pierre-Yves, Applied Probability Team
MARTIN-CHAVE Emmanuel, Optimization and systems
MOUNSIF Mohamed Amine, PDE and Materials,
NDIAYE Souleymane, PDE and Materials,
OURY Juliette, Optimization and systems
POLY Guillaume, Applied Probability Team
SAAFI Seifeddine, PDE and Materials,
SEBIH Mohammed, PDE and Materials, University of Tlemcen (Algeria)
TALLON Philippe, PDE and Materials,

Administrative Assistants (2)

BACCAERT Catherine, Ecole des Ponts ParisTech
OUHANNA Martine, Ecole des Ponts ParisTech

QUANTITATIVE RESULTS

KNOWLEDGE PRODUCTION

PUBLICATIONS

Publications in a international journals Journals with review committee

R. Abraham and J.-F. Delmas, changing the branching mechanism of a continuous state branching process using immigration, Annales Institut Henri Poincaré, 2009, vol. 45, n°1, pp. 226-238, doi:10.1239/jap/1261670681

R. Abraham and J.-F. Delmas, Williams' decomposition of the Lévy continuous random tree and simultaneous extinction probability for populations with neutral mutations, Stochastic Processes and their Applications, 2009, vol. 119, no4, pp. 1124-1143, doi:10.1214/07-AIHP165

B. Achchab, M. El Fatini, A. Ern and A. Souissi, A posteriori error estimates for subgrid viscosity stabilized approximations of convection-diffusion equations, Applied Mathematics Letters, 2009, vol.22, n°9, 1418-1424, oi:10.1016/j.aml.2008.12.006

A. Alfonsi, B. Jourdain, Exact volatility calibration based on a Dupire-type Call–Put duality for perpetual American options, Nonlinear Differential Equations and Applications, 2009, Vol.16, n°4, pp.523-554, doi:10.1007/s00030-009-0027-8

A. Anantharaman, E. Cancès, Existence of minimizers for Kohn-Sham models in quantum chemistry, Annales Institut Henri Poincaré, 2009, vol. 26, n°6, pp.2425-2455

N. Bouleau, L. Denis, Energy image density property and the lent particle method for Poisson measures, Journal of Functional Analysis, 2009, vol. 257, Issue 4, pp. 1144-1174,doi:10.1016, 2009.03.004

S. Boyaval , C. Le Bris , Y. Maday, N. Nguyen, A. Patera, A Reduced Basis Approach for Variational Problems with Stochastic Parameters: Application to Heat Conduction with Variable Robin Coefficient, Computer Methods in Applied Mechanics and Engineering, 2009, vol. 198, no 41-44, pp. 3187-3206, doi:10.1016/j.cma.2009.05.019

S. Boyaval, T. Lelièvre , C. Mangoubi, Free-energy-dissipative schemes for the Oldroyd-B model, Mathematical Modelling and Numerical Analysis, 2009, vol. 43, n°3, pp. 523-561, doi:10.1051/m2an/2009008

C. Brouder, G. Stoltz , G. Panati. The many-body Green function of degenerate systems, in "Physical Revu Letters 2009, vol.103, n°3, 230401, doi:10.1103/PhysRevLett.103.230401

E. Cancès, F. Legoll, M.-C. Marinica, K. Minoukadeh, F. Willaime, Some improvements of the ART method for finding transition pathways on potential energy surfaces, Journal of Chemical Physics, 2009, vol. 130, issue 11, 114711, doi: 10.1063/1.3088532

E. Cancès , G. Stoltz , G. Scuseria, V. Staroverov, E. Davidson, Local exchange potentials for electronic structure calculations, in Mathematics In Action, 2009, vol. 2, pp. 1-42.

P. Carpentier, J.-P. Chancelier, M. De Lara. Approximations of stochastic optimization problems subject to measurability constraints, SIAM Journal on Optimization, 2009, Vol. 19, Issue 4, pp. 1719-1734, doi: 10.1137/070692376

J.-P. Chancelier, M. De Lara, and A. de Palma. Risk aversion in expected intertemporal discounted utilities bandit problems, Theory and Decision, 2009, Vol. 67, Issue 4, pp. 433-440, doi:10.1007/s11238-008-9105-3

F. Chazel, M. Benoit, A. Ern and S. Piperno, A double-layer Boussinesq-type model for highly nonlinear and dispersive waves, Proceeding of the Royal Society A, 2009, vol.465, pp. 2319-2346, doi:10.1098/rspa.2008.0508

M. De Lara and V. Martinet, Multi-criteria dynamic decision under uncertainty: A stochastic viability analysis and an application to sustainable fishery management, Mathematical Biosciences, 2009, vol. 217, Issue 2, pp. 118-124, doi:10.1016/j.mbs.2008.11.003

J.-F. Delmas, B. Jourdain, Does waste recycling really improve the multi-proposal Metropolis-Hastings algorithm? An analysis based on control variates, Journal of Applied Probability, 2009, 46(4), pp.938-959, doi:10.1239/jap/1261670681

D. Doyen and A. Ern, Convergence of a space semi-discrete modified mass method for thedynamic Signorini problem, Communication in Mathematical Sciences, 2009, vol.7, n°4, pp.1063-1072

A. El Hajj, H. Ibrahim and R. Monneau, Dislocation dynamics: from microscopic models to macroscopic crystal plasticity, Continuum Mechanics and Thermodynamics, 2009, vol.21, pp. 109-123, doi:10.1007/s00161-009-0103-7

A. El Hajj, H. Ibrahim and R. Monneau, Homogenization of dislocation dynamics,Materials Science and Engineering, 2009, vol.3, n°1, doi:10.1088/1757-899X/3/1/012023.

A. Ern and S. Meunier, A posteriori error analysis of Euler-Galerkin approximations to coupled elliptic-parabolic problems, ESAIM Mathematical Modelling and Numerical Analysis, 2009, vol.43, n°2, pp.353-375, doi:101051/m2an:2008048

A. Ern, I. Mozolevski and L. Schuh, Accurate velocity reconstruction for Discontinuous Galerkin approximations of two-phase porous media flows, Comptes-Rendus Académie des Sciences Paris, Serie I, 2009, vol.347, pp.551-554, doi:10.1016/j.crma.2009.02.011

A. Ern, A. F. Stephansen and P. Zunino, A Discontinuous Galerkin method with weighted averages for advection-diffusion equations with locally small and anisotropic diffusivity, IMA journal of numerical analysis, 2009, vol.29, n°2, pp.235-256 doi:10.1093/imanum/drm050

A. Ern and M. Vohralik, Flux reconstruction and a posteriori error estimation for discontinuous Galerkin methods on general nonmatching grids, Comptes-Rendus Académie des Sciences Paris, Serie I, 2009, vol. 347, pp. 441-444, doi:10.1016/j.crma.2009.01.017

E. Faou, T. Lelièvre, Conservative stochastic differential equations: Mathematical and numerical analysis, Mathematics of computation, 2009, vol. 78, pp. 2047-2074

N. Forcadel, Comparison principle for a Generalized Fast Marching Method, SIAM Journal on numerical analysis, 2009, vol. 47, n°3, pp. 1923-1951, doi:10.1137/080718991

N. Forcadel and R. Monneau, Existence of solutions for a model describing the dynamics of junctions between dislocations, SIAM Journal on mathematical analysis, 2009, vol. 4, n°6, 2009, pp. 2517-2535, doi: 10.1137/070710925

N. Forcadel, C. Imbert and R. Monneau, Homogenization of the fully overdamped Frenkel-Kontorova models, Journal of Differential Equations, 2009, vol.246, pp. 1057-1097doi:10.1016/j.jde.2008.06.034

N. Forcadel, C. Imbert and R. Monneau, Homogenization of some particle systems with two-body interactions and of the dislocation dynamics, Discrete and Continuous Dynamical Systems A, vol. 23, n°3, 2009, pp 785-826, oi:10.3934/dcds.2009.23.785

N. Forcadel and A. Monteillet, Minimizing movements for dislocation dynamics with a mean curvature term, ESAIM: Control, Optimisation and Calculus of Variations, 2009, vol. 15, n°1, pp 214-244, doi:10.1051/cocv: 2008027

J.-F. Gerbeau, T. Lelièvre, Generalized Navier Boundary Condition and Geometric Conservation Law for surface tension, Computer Methods in Applied Mechanics and Engineering, 2009, vol. 198, no 5-8, pp. 644-656, doi:10.1016/j.cma.2008.09.011

P. Giannozzi, S. Baroni, N. Bonini, M. Calandra, R. Car, C. Cavazzoni, D. Ceresoli, G.L. Chiarotti, M. Cococcioni, I. Dabo, A.D. Corso, S. De Gironcoli, , S. Fabris, G. Fratesi, R. Gebauer, U. Gerstmann, C. Gougoussis, A. Kokalj, M. Lazzeri, L. Martin-Samos, N. Marzari, F. Mauri, R. Mazzarello, S. Paolini, A. Pasquarello, L. Paulatto, C.Sbraccia, S. Scandalo, G. Scandalo, G. Sclauzero, A.P. Seitonen, A. Smogunov, P. Umari, R.M. Wentzzcovitch, QUANTUM ESPRESSO: a modular and open-source software project for quantum simulations of materials, Journal of Physics: Condensed Matter, 2009, vol. 21, n°39, 5502, doi:10.1088/0953-8984/21/39/395502

C. Imbert, N. Forcadel and R. Monneau, Homogenization of the fully overdamped Frenkel-Kontorova models, Journal Differential Equations, 2009, Vol. 246, pp.1057-1097, doi:10.1016/j.jde.2008.06.034

C. Imbert, N. Forcadel and R. Monneau, Homogenization of some particle systems with two-body interactions and of the dislocation dynamics, Discrete and Continuous Dynamical Systems - Serie A, 2009, vol.23, no 3, pp.785-826. doi:10.3934/dcds.2009.23.785

B. Jourdain, J. Lelong, Robust Adaptive Importance Sampling for Normal Random Vectors, Ann. Appl. Probab., 2009, vol. 19, n°5, 1687-1718, doi:10.1214/09-AAP595 web of science

C. Le Bris, T. Lelièvre, Y. Maday, Results and questions on a nonlinear approximation approach for solving high-dimensional partial differential equations, Constructive Approximations, 2009, vol. 30, n° 3, pp.621-651, doi:10.1007/s00365-009-9071-1

T. Lelièvre, A general two-scale criteria for logarithmic Sobolev inequalities, Journal of Functional Analysis, 2009, vol. 256, n° 7, pp. 2211-2221, doi:10.1016/j.jfa.2008.09.019

J.-B. Maillet, E. Bourasseau, L. Soulard, J. Clerouin, G. Stoltz, Constant entropy sampling and release waves of shock compressions, Physical. Revue E, 2009, vol. 80, 021135, doi:10.1103/PhysRevE.80.021135

J.-B. Maillet, G. Stoltz, Sampling constraints in average: The example of Hugoniot curves,

Applied Mathematics Research eXpress, 2009, vol. 2008, article ID abn004, doi:10.1093/amrx/abn004

R. Monneau, N. Forcadel, C. Imbert, Recent results on dislocations dynamics and homogenization, proceedings of ICIAM 2007, vol. 7, Issue 1, pp. 1040203 -1040204 (http://www3.interscience.wiley.com/journal/91016652/home). doi:10.1002/pamm.200701064

R. Monneau, G. S. Weiss, Pulsating traveling waves in the singular limit of a reaction-diffusion system in solid combustion, Annales Institut Henri Poincaré, Analyse Non Linéaire, 2009, vol.26, n°4, pp. 1207-1222, doi:10.1016/j.anihpc.2008.09.002

R. Monneau, N. Forcadel, C. Imbert, Homogenization of the dislocation dynamics and of some particle systems with two-body interactions, Discrete and Continuous Dynamical Systems - A, 2009, vol. 23, n°3, pp.785 – 826

R. Monneau, N. Forcadel and C. Imbert, Homogenization of fully overdamped Frenkel-Kontorova models, Journal of Differential Equations, 2009, vol. 246, n°3, pp.1057-1097, doi:10.1016/j.jde.2008.06.034

R. Monneau, N. Forcadel, Existence of solutions for a model describing the dynamics of junctions between dislocations, SIAM Journal on Mathematical Analysis, 2009, vol.40, no. 6, pp.2517-2535, doi: http://dx.doi.org/10.1137/070710925

R. Monneau, R. Benguria and J. Dolbeault, Harnack inequalities and discrete-continuum error estimates for a chain of atoms with two-body interactions, Journal on Statistical Physics, 2009, vol. 134, n°1, pp. 27-51, doi:10.1007/s10955-008-9662-4

R. Monneau, H. Ibrahim, On a parabolic logarithmic Sobolev inequality, Journal of Functional Analysis, 2009, vol. 257, n° 3, pp. 903-930, doi:10.1016/j.jfa.2009.01.008

R. Monneau, A. Briani, Time-homogenization of a first order system arising in the modelling of the dynamics of dislocation densities, Comptes- Rendus de l'Académie des Sciences de Paris, Serie I, 2009, vol. 347, pp. 231-236, doi:10.1016/j.crma.2009.01.006

R. Monneau, Pointwise estimates for Laplace equation. Applications to the free boundary of the obstacle problem with Dini coefficients, Journal of Fourier Analysis and Applications, 2009, vol. 15, n°3, pp.279-335, doi:10.1007/s00041-009-9066-0

R. Monneau, A. El Hajj, H. Ibrahim, Dislocation dynamics: from microscopic models to macroscopic crystal plasticity, Continuum Mechanics and Thermodynamics, 2009, vol. 21, n° 2, pp. 109-123, doi:10.1007/s00161-009-0103-7

R. Monneau, H. Ibrahim and M. Jazar, Dynamics of dislocation densities in a bounded channel. Part II: existence of weak solutions to a singular parabolic/Hamilton–Jacobi strongly coupled system, Communication in Partial Differential Equations, 2009, vol.34, n°8, pp. 889-917, doi:10.1080/03605300903011861

P. Sabino, Efficient Quasi-Monte Simulations for Pricing High-dimensional Path-dependent Options, Decisions in Economics and Finance, 2009, vol. 32, n° 1, pp. 49-65, doi:10.1007/s10203-009-0084-9

P. Sochala, A. Ern and S. Piperno, Mass conservative BDF-discontinuous Galerkin/explicit finite volume schemes for coupling subsurface and overland flows, Computer Methods in Applied Mechanics and Engineering, 2009, vol.198, issues 27-29, pp. 2122-2136, doi:10.1016/j.cma.2009.02.024

G. Stoltz, M. Lazzeri, F. Mauri, Thermal transport in isotopically disordered carbon nanotubes, Journal of Physics: Condensed Matter, 2009, vol. 21, n°24, doi: 10.1088/0953-8984/21/24/245302

G. Stoltz, N. Mingo, F. Mauri, Reducing the thermal conductivity of carbon nanotubes below the random isotope limit, Physical Review B, 2009, vol. 80, n°11, doi:10.1103/PhysRevB.80.113408

Publications in other journal

N. Bouleau, The lent particle method for marked point processes, Séminaire Probabilités de Strasbourg

Written communications in International conferences

N. Bouleau, L. Denis, Dirichlet forms for Poisson measures and Lévy processes: the lent particle method, Proceedings of the International Workshop on Stochastic Analysis and Finance, Hong-Kong, June-July 2009

N. Bouleau, L.Denis, Proving existence of densities for solutions of SDE's via the lent particle method", Proceedings of the International Workshop on Stochastic Analysis and Finance, Hong-Kong, June-July 2009

N. Bouleau, Dirichlet forms methods for Poisson measures and Lévy processes, M3ST '09 International Conference on Modern Mathematical Methods in Science and Technology, Poros, Greece, 3–5 September 2009

R. Monneau, A. El Hajj and H. Ibrahim, Derivation and study of dynamical models of dislocation densities, (proceedings of CANUM 2008), ESAIM: Proceedings, Vol. 27, May 2009, pp. 227-239

R. Monneau, A. El Hajj and H. Ibrahim, Homogenization of dislocation dynamics, Proceedings of the conference Dislocations 2008, Hong Kong), IOP Conferences Series: Materials Science and Engineering, vol.3, 2009, 012023, doi:10.1088/1757-899X/3/1/012023

Invited talk in international conference

A. Alfonsi, A closed-form extension to the Black-Cox model, Recent Advancements in the Theory and Practice of Credit Derivatives, Nice 30th September 2009

S. Boyaval, Minisymposium "Reduced-Basis methods" at ICOSAHOM 09 in Trondheim, Norway, June 2009

S. Boyaval, Minisymposium "Advances in numerical methods for non-Newtonian flows" at 8th Enumath 2009 in Uppsala, Sweden, June 2009

S. Cacace, "Fifth Summer School in Analysis and Applied Mathematics", Rome (Italy), June 1-5, 2009

E. Cancès, EPSRC symposium workshop on computational PDEs, Warwick, January 11-17, 2009

E. Cancès, IPAM workshop on computational kinetic transport and hybrid methods, Los Angeles, March 30-April 3, 2009

E. Cancès, MAFELAP conference, London, June 9-12, 2009

P. Carpentier, G. Cohen P. Girardeau, A Comparison of Sample-based Stochastic Optimal Control Methods for Power System Management, 20th International Symposium on Mathematical Programming, Chicago, 23-28 August 2009

I. Dabo, International Center of Theoretical Physics, 14th Total Energy Workshop, Trieste, January 2009

M. De Lara, "Discrete-Time Viability Methods for Sustainable Management of Natural Resources" at XXIII Jornada de Matemática de la Zona Sur, Universidad de Magallanes, Chile, April 28-29 2009

M. De Lara, "Discrete-Time Viability Methods for Sustainable Management of Natural Resources" at VI Congreso Latinoamericano de Biología Matemática), Acapulco, Mexique, 16-20 November 2009

J.-F. Delmas, Stochastic processes and their applications: A continuum-tree valued Markov process, Berlin, Allemagne, July 2009

A. El Hajj, Workshop on Control Theory and Applications, Monastir, Tunisia, November 2009

C. Imbert, Workshop on Viscosity Solutions and Related Topics, Tokyo, January 2009

C. Imbert, Analysis of nonlinear PDEs and free boundary problems; Applications to homogenization, PIMS Vancouver, 20-24 July 2009

B. Jourdain, High order discretization schemes for stochastic volatility models, Workshop computational Finance, RIMS Kyoto University 10-12 August 2009

B. Jourdain, Exercise boundary of the American put option in the black-Scholes model with discrete dividends, Workshop on Optimal stopping and singular stochastic control problems in finance, National University of Singapore, 9-15 December 2009

C. Le Bris, Series of lectures, Multiscale problems, University of Santiago de Compostela, June 2009

C. Le Bris, plenary lecture, ENUMATH, Uppsala, Sweden, June 29- July 3, 2009

C. Le Bris, Workshop Mathematical Theory and Computational Methods in Materials Sciences'', August 10-14, 2009, Singapore

---

C. Le Bris, Workshop New Trends in Model Coupling. Theory, Numerics and Applications, 2-4 September, 2009, Paris

---

C. Le Bris, Workshop Modeling and Simulation of Multi-Scale and Multi-Physics Systems, Leuven, Belgium, September 8-9, 2009

C. Le Bris, plenary lecture, Congress XXI CEDYA (Congreso de Ecuaciones Diferenciales Y Aplicaciones) - XI CMA (Congreso de Matematica Aplicada), September 21-25, 2009, Ciudad Real (Spain)

C. Le Bris, Aisenstadt Chair, University of Montréal, October 2009

C. Le Bris, Workshop Numerical Analysis of Multiscale Computations, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), December 6-11, 2009

T. Lelièvre, Multiscale models for viscoelastic fluids: numerics and long-time behaviour, Workshop Adaptivity, robustness and complexity of multiscale algorithms, ICMS, Edinburg, April 2009

R. Monneau, Pointwise regularity for the obstacle problem, seminar of Stockholm University, June 2009

R. Monneau, Homogenization of Frenkel-Kontorova models and dislocation dynamics, seminar of Max Planck Institute, Leipzig, June 2009

R. Monneau, Homogenization of dislocation dynamics, 8th GAMM Seminar Microstructures, Regensburg, Germany, January 2009
R. Monneau, Homogenization of Frenkel-Kontorova models and dislocation dynamics, Variational analysis and applications, International School of Mathematics Guido Stampacchia, 51st Workshop, Sicily, May 2009

S. Olla, Conference France-Bresil, Rio de Janeiro, Brazil, 10 September, 2009

G. Stoltz, Adaptivity robustness and complexity of multiscale algorithms ICMS workshop, Edinburgh, United-Kingdom, March 2009

Invited talk in national conference

N. Bouleau, Réflexions sur la mathématisation des risques, Défis actuels de la finance : Nouvelles approches théoriques et Gestion des risques bancaires et financiers 12-13 Novembre 2009 CEPN, LAGA Université Paris 13

N. Bouleau, La formule de la particule prêtée, séminaire d'analyse stochastique, 7 janvier 2009, IHP Paris

---

N. Bouleau, La formule de la particule prêtée : quelques applications à la densité de fonctionnelles de Lévy, Journées de Probabilités 2009, Université de Poitiers

---

S. Cacace, A posteriori error estimates for the effective Hamiltonian of dislocation dynamics, short talk at Motions of Interfaces and Nonlinear PDEs - Final Conference of the ANR MICA Project, February 1-4, 2010, Tours

---

E. Cancès, LN3M Workshop, 28-30 September 2009, Lyon

J.-F. Delmas, Self similar processes and their applications: A continuum-tree valued Markov process, July 2009, Angers

---

A. Ern, "Discontinous Galerkin Methods", Advances in Scientific Computing, CIRM, Luminy, February 2009

A. Ern, "Discrete functional analysis tools for DG methods", Workshop on Discretization Methods for Viscous Flows, Porquerolles, June 2009

Minoukadeh, Workshop LN3M 2009, ENS Lyon, September 28-30, 2009

R. Monneau, September 2009, seminar Bilan de la chaire MMSN, Ecole Polytechnique

Platform presentation/presentation in international conference

A. Anantharaman, CIMPA-UNESCO-Egypt School "Recent developments in the theory of elliptic partial differential equations", AAST, January 26th - February 3rd, 2009, Alexandria

---

A. Anantharaman, 33rd Conference on Stochastic Processes and Their Applications, July 27th-31st, 2009, TU Berlin

---

S. Boyaval, MoRePaS 09 in Muenster, Germany, September 2009

R. Costaouec, Stochastic Processes and their Applications, July 27-31, 2009, Technische Universitat, Berlin

---

R. Costaouec, SIAM Conference on Analysis of Partial Differential Equations, December 7-10, 2009, Miami

---

M. De Lara, Sustainable quotas and viable management of ecosystems, DIVERSITAS OSC2, 13-16 October 2009, Cape Town, South Africa

---

A. Ern, Mass conservative schemes for coupling the Richards equation with surface flow, SIAM GS, June 2009, Leipzig, Germany

---

A. Ern, Explicit Runge-Kutta schemes and finite elements with symmetric stabilization for first-order linear PDE systems, MAFELAP, June 2009, Brunel, UK

A. Ern, Discrete functional analysis tools for discontinuous Galerkin methods, MAFELAP, June 2009, Brunel, UK

T. Lelièvre, A nonlinear approximation approach for solving high-dimensional partial differential equations, Third Conference on Numerical Methods in Finance, Ecole des Ponts ParisTech, Paris, April 2009

T. Lelièvre, Sampling problems in molecular dynamics, plenary speaker at the EPSRC Symposium Capstone Conference, Warwick, 5 June 2009

T. Lelièvre, Entropy methods for studying the long-time behaviour of adaptive importance sampling methods, Workshop Theory and Numerics for Kinetic Equations, Saarbrucken, November 2009

T. Lelièvre, Effective dynamics for the overdamped Langevin equation, Workshop BIRS on Numerical Analysis of Multiscale Computations, Banff, December 2009

L. Monasse, C. Mariotti, A Hamiltonian Discrete Element Method for Linear Elasticity in Large Deformation, USNCCM 10, July 2009, Columbus, Ohio

---

S. Olla, Workshop on Atomistic Models of Solids, University of Oxford, December 7, 2009

S. Olla, Material Theories, Oberwolfach,

December 14-19, 2009

P. Sabino, Convenient Multiple Directions of Stratification, at Mathematical and Statistical Methods for Actuarial Sciences and Finance 2010, 7-9 April 2010, Villa Rufolo - Ravello, Italy

---

P. Tassi, Morphodynamics Discontinuous Galerkin Modelling with Applications to Stratigraphy, SIAM Conference on Mathematical & Computational Issues in the Geosciences (GS09), June 2009 Leipzig, Germany

---

G. Stoltz, Computational Statistical Physics: A Mathematical Overview, Mathematical methods for ab-initio quantum chemistry, Nice, France, 15-16 October 2009

G. Stoltz, Some nonlinear dynamics for computational statistical physics, ICNAAM 2009, Rethymno, Greece, 17-22 September 2009

Platform presentation/presentation in national conference

A. Anantharaman, 12ème Rencontre du Nonlinéaire, IHP, March 11th-13th, 2009

A. Anantharaman, Journées du GdR MASCOT-NUM, University Paris XIII & IHP, March 18th-20th, 2009

S. Boyaval, GDR MASCOT, March 2009, IHP, Paris

A. El Hajj, CaSciModOT Day, December 2009, Orleans

A. El Hajj, meeting of ANR METHODE, October 2009, Orleans

A. El Hajj, Control and EDP, June 2009, Orleans

A. Ern, Discontinuous Galerkin approximation of two-phase flows in heterogeneous porous media with distinct capillary pressures, MOMAS Biennal, November 2009, CIRM, Luminy

---

N. Forcadel, Workshop SMAI 2009, 25-29 May 2009, La Colle sur loup

---

N. Forcadel, Séminaire Parisien d'optimisation, December 14, 2009, Paris

---

B. Jourdain and T. Lelièvre, Adaptive Importance Sampling methods in Molecular Dynamics, Workshop probability and PDEs, 24-26th June 2009, Sophia-Antipolis, Nice

---

T. Lelièvre, Meeting on PDEs, Stochastic Analysis and Simulation of Processes, June 2009, Sophia-Antipolis, Nice

---

L. Monasse, V. Daru, C. Mariotti, S. Piperno, Couplage conservatif entre une méthode élements discrets pour un solide déformable et une méthode fluide compressible volumes finis, congrès de la SMAI, May 2009, La Colle sur Loup.

Poster in international conference

K. Minoukadeh, Adaptive Biasing Force Simulations with Multiple Replicas, FOMMS 2009, July 12-16, 2009, Blaine, WA

K. Minoukadeh, Some improvements of the Activation-Relaxation Technique (ART), Molecular Simulations: Algorithms, Analysis and Applications, IMA, MN, May 18-22, 2009, University of Minnesota, Minneapolis

---

K. Minoukadeh, Some improvements of the Activation-Relaxation Technique (ART), Rare Events in High-Dimensional Systems, IPAM, February 23-27, 2009, UCLA, CA, Los Angeles

---

G. Stoltz, IPAM, Adaptive Importance Sampling Strategies, Workshop “Rare Events”, February 2009, Los Angeles

Article to appear

A. Alfonsi, A. Fruth, A. Schied, Optimal execution strategies in limit order books with general shape functions, Quantitative Finance, doi:10.1080/14697680802595700

A. Alfonsi, High-order discretization scheme for the CIR process: application to the Heston model, Mathematics of Computation, doi:10.1090/S0025-5718-09-02252-2

A. Alfonsi, Cox-Ingersoll-Ross (CIR) model, Encyclopedia in Finance, to appear in 2010.

K. Barty, P. Carpentier, P.Girardeau, Decomposition of large-scale stochastic optimal control problems, to appear in RAIRO Operations Research in 2010

X. Blanc, C. Le Bris, F. Legoll, C. Patz, Finite-temperature coarse-graining of one-dimensional models: mathematical analysis and computational approaches, in "Journal of Nonlinear Science", in press, 2009

X. Blanc, C. Le Bris, Improving on the calculations of homogenized coefficients in the periodic and quasi-periodic settings, in "Networks and Heterogeneous media", in press, 2009

S. Boyaval, T. Lelièvre, A Variance Reduction Method for Parametrized Stochastic Differential Equations using the Reduced Basis Paradigm, in "Communication in Mathematical Sciences", in press, 2009

E. Cancès, M. Lewin, The dielectric permittivity of crystals in the reduced Hartree-Fock approximation, in Archive for Rational Mechanics and Analysis, in press, 2009

R. Costaouec, C. Le Bris, F. Legoll, Approximation numérique d'une classe de problèmes en homogénéisation stochastique, in "Note aux Comptes Rendus de l'Académie des Sciences", in press, 2009

J.-F. Delmas and L. Marsalle, Detection of cellular aging in a Galton-Watson process, to appear in Stochastic Processes and Applications

---

A. El Hajj, M. Cannone, R. Monneau and F. Ribaud, Global existence for a system of non-linear and non-local transport equations describing the dynamics of dislocation densities. Accepted to Archive for Rational Mechanics and Analysis

---

A. El Hajj, Short time existence and uniqueness in Holder spaces for the 2D dynamics of dislocation densities. Accepted to Annales de l'Institut Henri Poincaré (C) Non Linear Analysis

---

A. El Hajj and R. Monneau, Global continuous solutions for diagonal hyperbolic systems with large and monotone data. Accepted to Journal of Hyperbolic Differential Equations

---

A. El Hajj and R. Monneau, Some uniqueness results for diagonal hyperbolic systems with large and monotone data

---

P. Etoré, B. Jourdain, Adaptive optimal allocation in stratified sampling methods, to appear in Methodology and Computing in Applied Probability. doi:10.1007/s11009-008-9108-0

P. Etoré, G. Fort, B. Jourdain, E. Moulines, On Adaptive Stratification, to appear in Annals of Operations Research, doi:10.1007/s10479-009-0638-9

N. Forcadel, C. Imbert and R. Monneau, Spirals moving by mean curvature. Part I: a comparison principle, ADS/Smithsonian Astrophysical Observatory

---

B. Jourdain A. Kohatsu-Higa, A rewiew of recent results on approximation of solutions of stochastic differential equations, to appear in proceedings of the WSAF09 conference

---

B. Jourdain, M. Sbai, Coupling Index and Stocks, to appear in Quantitative Finance

---

B. Jourdain, T. Lelièvre, R. Roux, Existence, uniqueness and convergence of a particle approximation for the Adaptive Biasing Force process, to appear in ESAIM: M2AN, 2010 special issue, available at http://hal.archives-ouvertes.fr/hal-00370821/fr/

C. Le Bris, F. Legoll, Integrators for highly oscillatory Hamiltonian systems: an homogenization approach, in "DCDS-B", in press, 2009.

P. Sabino, Implementing Quasi-Monte Carlo Simulations with Linear Transformations. Computational Management Science, disponible sur online first

Scientific books

B. Jourdain, Probabilités et statistique, Ellipses, 2009, ISBN 978-2-7298-4169-0

I. Dabo, Towards First-principles Electrochemistry: Ab-initio Study of Electrochemical Energy Conversion Systems, Lambert Academic Publishing, 2009, ISBN 978-3838316185

Book chapters

L. Andrieu, M. De Lara, B. Seck, Taking Risk into Account in Electricity Portfolio Management. In Steffen Rebennack, Panos M. Pardalos, Mario V.F. Pereira, Niko A. Iliadis, editors, Handbook of Power Systems 1, Series: Energy Systems. Springer Verlag, 2009, ISBN: 978-3-642-02492-4. Forthcoming

---

M. De Lara and L. Gilotte, Precautionary effect and variations of the value of information, In Jerzy Filar and Alain Haurie, editors, Uncertainty and Environmental Decision Making, International Series in Operations Research and Management Science, Vol. 138, Springer Verlag, 2009, 239-253. ISBN: 978-1-4419-1128-5

A. Ern and S. Piperno, in "Traité d'hydraulique environnementale", J.-M. Tanguy Editor, 2009, Vol. 5 chap. 5 and vol. 6 chap.1, ISBN 978-2-7462-2007-2 and 978-2-7462-2008-9

B. Jourdain, Adaptive variance reduction techniques in finance, Advanced Financial Modelling, Radon Series on Computational and Applied Mathematics 8, Ed. by H. Albrecher, W. Runggaldier and W. Schachermayer, de Gruyter, 2009, pp. 205-222, ISBN 978-3-11-021313-3

C. Le Bris, T. Lelièvre, Multiscale modelling of complex fluids: A mathematical initiation, B. Engquist, P. Lotstedt and O. Runborg eds., Vol. 66, Springer, 2009, Lecture Notes in Computational Science and Engineering, pp. 49-138. ISBN: 978-3-540-88856-7

Preprint-hal

R. Abraham and J.-F. Delmas, A continuum-tree-valued Markov process, http://hal.archives-ouvertes.fr/hal-00379118/fr/

A. Alfonsi, A. Schied, Optimal execution and absence of price manipulations in limit order book models, June 2009, http://hal.archives-ouvertes.fr/docs/00/47/74/73/PDF/OTGE13.pdf

---

A. Alfonsi, A. Schied, A. Slynko, Order Book Resilience, Price Manipulation, and the Positive Portfolio Problem, October 2009, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1498514

A. Alfonsi, J. Lelong, A closed-form extension to the Black-Cox model, September 2009, http://hal.archives-ouvertes.fr/docs/00/46/79/05/PDF/Credit_parisian.pdf

---

A. Alfonsi, An introduction to the multiname modelling in credit risk (Survey that should be part of a book edited by T. Bielecki, D. Brigo and F. Patras).

A. Anantharaman, C. Le Bris, Homogénéisation d'un matériau périodique faiblement perturbé aléatoirement, in "Note aux Comptes Rendus de l'Académie des Sciences", submitted, 2009

Bansaye V., J.-F. Delmas, L. Marsalle and V.C. Tran, Limit theorems for Markov processes indexed by continuous time Galton-Watson trees, hal-00431118 (10/11/2009) http://hal.archives-ouvertes.fr/hal-00431118

J.W. Barrett, S. Boyaval, Existence and approximation of a (regularized) Oldroyd-B model, Mathematical Models and Methods in Applied Sciences, submitted, 2009, http://fr.arxiv.org/abs/0907.4066.

X. Blanc, C. Le Bris, F. Legoll, T. Lelièvre, Beyond multiscale and multiphysics: multimaths for model coupling, Networks and heterogeneous Media, submitted, 2009

S. Boyaval, C. Le Bris, T. Lelièvre, Y. Maday, N. Nguyen, A. Patera, Reduced Basis methods for stochastic problems, Archives of Computational Methods in Engineering : State

of the Art Reviews, submitted, 2009, http://hal.archives-ouvertes.fr/hal-00470522/fr/

C. Brouder , G. Stoltz , G. Panati, Gell-Mann and Low formula for degenerate unperturbed states, Annales de l'Institut Henri Poincaré, submitted, 2009, http://arxiv.org/abs/0906.1853

E. Burman, A. Ern and M. Fernandez, Explicit Runge--Kutta schemes and finite elements with symmetric stabilization for first-order linear PDE systems, hal-00380659, May 2009 http://hal.archives-ouvertes.fr/hal-00380659/en/

S. Cacace, A.Chambolle, R.Monneau, A posteriori error estimates for the effective Hamiltonian of dislocation dynamics", submitted to Numerische Mathematik

---

E. Cancès, R. Chakir, Y. Maday, Numerical analysis of nonlinear eigenvalue problems, Journal of Scientific Computing, submitted, preprint arXiv:0905.1645, 2009, http://arxiv.org/abs/0909.1464

I. Dabo, E. Cancès, Y. L. Li, N. Marzari, First-principles Simulation of Electrochemical Systems at Fixed Applied Voltage: Vibrational Stark effect for CO on platinum electrodes, submitted, 2009, http://arxiv.org/abs/0901.0096

I . Dabo, M. Cococcioni, and N. Marzari, Non-Koopmans Corrections in Density-Functional Theory: Self-interaction Revisited, arXiv: 0901.2637, submitted, 2009. http://arxiv.org/abs/0901.2637

M. De Lara, Environmental Noise Variability in Population Dynamics Matrix Models, 2009 HAL: hal-00410131, arXiv,

---

M. De Lara, Preferences Yielding the Precautionary Effect, 2009, HAL: hal-00406939

M. De Lara, P. Gajardo, H. Ramirez Cabrera, Viable harvest of monotone bioeconomic models, 25/06/2009, HAL: hal-00399235, arXiv

---

D. Doyen, A. Ern and S. Piperno, Time-integration schemes for the finite element dynamic Signorini problem, December 2009, hal.archives-ouvertes.fr/hal-00440128/fr

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D. Doyen and A. Ern, Convergence of a space semi-discrete modified mass method for the dynamic Signorini problem, July 2009, http://hal.archives-ouvertes.fr/hal-00404248/fr

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D. Doyen, A. Ern and S. Piperno, A three-field augmented Lagrangian formulation of unilateral contact problems with cohesive forces, hal-00349836, January 2009, http://hal.archives-ouvertes.fr/hal-00349836/fr/

B. Dickson, F. Legoll, T. Lelièvre, G. Stoltz, P. Fleurat-Lessard. Free energy calculations: An efficient adaptive biasing potential method, in "arXiv preprint", vol. 0911.2090, 2009. http://hal.archives-ouvertes.fr/hal-00431332/fr/

L. El Alaoui, A. Ern and M. Vohralik, Guaranteed and robust a posteriori error estimates and balancing discretization and linearization errors for monotone nonlinear problems, September 2009, hal.archives-ouvertes.fr/hal-00410471/fr/

A. Ern and M. Vohralik, A posteriori error estimation based on potential and flux reconstruction for the heat equation, May 2009, hal.archives-ouvertes.fr/hal-00383692/fr

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A. Ern, I. Mozolevski and L. Schuh, Discontinuous Galerkin approximation of two-phase flows in heterogeneous porous media with discontinuous capillary pressures, March 2009, hal.archives-ouvertes.fr/hal-00368026/fr/

N. Forcadel, E. Carlini and R. Monneau, Generalized Fast Marching Method for dislocation dynamics, September 2009, http://hal.archives-ouvertes.fr/hal-00415902/fr/

N. Forcadel, C. Imbert and R. Monneau, Homogenization of overdamped Frenkel-Kontorova models with n types of particles, http://hal.archives-ouvertes.fr/hal-

00387818/fr/

P. Girardeau, A comparison of sample-based Stochastic Optimal Control methods, Optimization Online http://www.optimization-online.org/DB_HTML/2010/02/2538.html

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M. Hauray, C. Le Bris, A new proof of the uniqueness of the flow for ODEs with BV vector fields, 2009

B. Jourdain, M. Sbai, High order discretization schemes for stochastic volatility models, Preprint HAL 00409861http://hal.archives-ouvertes.fr/hal-00409861/

B. Jourdain, M. Vellekoop, Regularity of the Exercise Boundary for American Put Options on Assets with Discrete Dividends, Preprint HAL00436327 http://hal.archives-ouvertes.fr/hal-00436327/

C. Le Bris, Some numerical approaches for "weakly" random homogenization, 2009

F. Legoll, T. Lelièvre, Effective dynamics using conditional expectations, in "Nonlinearity", submitted 2009. http://hal.archives-ouvertes.fr/hal-00399986/fr/

K. Minoukadeh, C. Chipot, T. Lelièvre, Parallel algorithms for free energy calculations: A multiple-replica adaptive biasing force approach, 2009

L. Monasse and C. Mariotti, An energy-preserving Discrete Element Method for elastodynamics, July 2009, http://hal.archives-ouvertes.fr/hal-00403919/fr/

E. Ocana Anaya, M. De Lara, Ricardo Oliveros-Ramos, Jorge Tam, Viability Kernel for Ecosystem Management Models, 2009, http://hal.archives-ouvertes.fr/hal-00390822/fr/

S. Perotto, A. Ern and A. Veneziani, Hierarchical local model reduction for elliptic problems: a domain decomposition approach, April 2009, http://hal.archives-ouvertes.fr/hal-00377492/fr/

P. Sabino, B. Jourdain, B. Lapeyre, Convenient Multiple Directions of Stratification, http://hal.archives-ouvertes.fr/hal-00477403/fr/

J. Tryoen, O. Le Maître, M. Ndjinga and A. Ern, Multi-resolution analysis and upwinding for uncertain nonlinear hyperbolic systems, April 2009, http://hal.archives-ouvertes.fr/hal-00375616/fr/

EDITORIAL BOARDS/ACTIVITY

E. Cancès, co-Editor in chief (with P. Del Moral and J.-F. Gerbeau) (2005) of ESAIM Proceeding

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E. Cancès, associate editor of Mathematical Modelling and Numerical Analysis (2006) and of SIAM Journal of Scientific Computing (2008).

M. De Lara, associate editor of the journal Environmental Modelling and Assessment

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J.-F. Delmas, Member of the Editorial board of "Applied Mathematics Research eXpress" (AMRX)

C. Le Bris, co-Editor-in-chief (with A.T. Patera, MIT) (2005) of Mathematical Modeling and Numerical Analysis

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C. Le Bris, Editor-in-chief of Applied Mathematics Research Express (2003)

C. Le Bris, associate editor of Archive for Rational Mechanics and Analysis (2004), COCV (Control, Optimization and Calculus of Variations) (2003), 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).

C. Le Bris, a member of the editorial board of the monograph series: Mathématiques et Applications, Series, Springer (2008), and Modeling, Simulations and Applications, Series, Springer (2009).

S. Olla is associate editor of The Annals of Probability (2009)

MEMBERS OF SCIENTIFIC COMMITTEES

A. Ern, ANDRA Scientific Committee

C. Le Bris has been a member of:
- the Scientific Program Committee of ICIAM 2011, Vancouver, Canada
- the scientific board of Ecole des Ponts ParisTech, 2008- (nominated as representative of the research scholars)
- the "Comité d'experts" for the "Fondation de Recherche pour l'Aéronautique et l'Espace",
- the "Comité d'animation du domaine thématique Mathématiques appliquées, calcul et simulation" at INRIA
- (as Co-chair) the ESF-EMS international conference on "Highly Oscillatory Problems", 13-17 September 2010, Isaac Newton Institute for Mathematical Sciences, Cambridge

S. Olla is:
- the scientist in charge of the agreement USP-COFECUB UC103/06: Stochastic models, Genomic and phonetic (2005-2009)
- a member of the Scientific Board of the agreement GREFI-MEFI between CNRS and INDAM (Istituto Nazionale di Alta Matematica, Italy)
- the local coordinator of the project ANR LHMSHE (programme ANR blanc 2007), Limit hydrodynamics and statistical mechanics except balance in the University of Paris Dauphine
- a member of the steering committee of the Paris Graduate School, a project sponsored by the Mathematical Foundation of Paris

P. Tassi, member of the scientific committee of 6th Symposium on River, Coastal and Estuarine Morphodynamics, RCEM Santa Fe, Argentine, 2009

CONFERENCES/SEMINARS/ MISSIONS/VISITS

Conferences/participation

International conferences Communications

A. Alfonsi, J.-F. Delmas, B. Jourdain, B. Lapeyre, 3rd Conference on numerical methods in finance, 15-17 April 2009, Ecole des Ponts ParisTech

E. Cancès has co-organized the Workshop on continuum modelling of biomolecules, 14-17 September 2009, Beijing

E. Cancès has co-organized with F. Legoll a mini-symposium on Numerical methods and their applications in molecular simulation, ICNAAM 2009 conference, 18-22 September 2009, Greece (Rethymno, Crete)

M. De Lara, Co-organizer of the symposium S10: "Management tools for marine biodiversity" Organisers: Melanie Austen (UK), Michel De Lara (France), DIVERSITAS OSC2,13-16 October 2009, Cape Town, South Africa

C. Le Bris and T. Lelièvre have co-organized a workshop on numerical methods in rheology, Ecole des Ponts ParisTech, January 2009 http://cermics.enpc.fr/lelievre/Workshop_Complex_Fluid/workshop.html.

C. Le Bris, the organizing committee of the IMA thematic year Mathematics and Chemistry, Minneapolis 2008-2009

C. Le Bris, the organizing committee of the international conference "Dynamical Analysis of Molecular Systems", Edinburgh, June 28-July 2, 2010

National conferences communications

A. Ern, MOMAS Biennal, CIRM, Luminy, 23-25 november 2009

Conference/seminar organized

International seminar

A. Alfonsi, High order discretization schemes for the CIR process: application to Heston and Affine models, Oxford Man institute of quantitative finance

E. Cancès, weekly seminar of the mathematics department, Freie Universitat Berlin

E. Cancès, weekly seminar of the mathematics department, Oxford University

E. Cancès, weekly seminar of the mathematics department, University of California Santa Barbara

E. Cancès, weekly seminar of the mathematics department, University of California San Diego

E. Cancès, weekly seminar of the mathematical department, Technische

Universitat Munich, April 2009

E. Cancès, weekly seminar of the Institute of computational mathematics, Chinese Academy of Sciences, September 2009

M. De Lara, Sustainable Management of an Hake--Anchovy Peruvian Ecosystem Model by Viability Methods, Workshop /Integrated modelling approaches for management of marine resources/IFREMER Brest from the 8th to 11th September

M. De Lara, Modelos y Métodos Cuantitativos para el Manejo Sustentable de Recursos Naturales, Workshop Modelos y Métodos Cuantitativos para el Manejo Sustentable de Recursos Naturales, The Universidad del Valle and Universidad Autónoma de Occidente in Cali, Colombia, 26-27 November 2009

A. Ern, Discrete functional analysis tools for DG, Berlin University, May 2009

C. Le Bris, Boeing Distinguished Colloquium, University of Washington at Seattle, January 2009

C. Le Bris, Carnegie Mellon University, April 2009

C. Le Bris, Solid Mechanics Seminar, University of Minnesota, April 2009

C. Le Bris, Frontiers of Scientific computing Seminar, Lousiana State University, April 2009

C. Le Bris, ICES Seminar Series, University of Texas at Austin, April 2009

C. Le Bris, Bath Colloquium Series Landscapes in Mathematical Science, Bath, UK, November 2009

C. Le Bris, Séminaire IRSAMC Toulouse, November 2009

T. Lelièvre, ALE method for two-fluid flows. Applications to aluminium electrolysis, Mathematics seminar at the Imperial College, London, March 2009

T. Lelièvre, Adaptive methods for free energy computations, IMA Tutorial: Methods of Molecular Simulation, Minneapolis, May 2009

T. Lelièvre, Adaptive stochastic dynamics for the computation of free energy differences, IMA seminar on Mathematics and Chemistry, Minneapolis, May 2009

T. Lelièvre, Adaptive importance sampling, and application to Bayesian statistics, Warwick seminar on Applied Mathematics and Statistics, October 2009

L. Monasse, V. Daru, C. Mariotti, S.Piperno, "An explicit, conservative Immersed Boundary Method for the interaction of a compressible flow with an elastic structure", Academy Colloquium on Immersed Boundary Methods, Amsterdam, June 2009

S. Olla, Probability seminar, University of Minnesota, Minneapolis, USA, October 9, 2009

S. Olla, Probability seminar, University of Budapest, Hungary, November 19, 2009

G. Stoltz, Adiabatic switching for degenerate ground states, IMA seminar on mathematics and chemistry, Minneapolis, May 2009

National seminar

A. Alfonsi, High order discretization schemes for the CIR process: application to Heston and Affine models, University Paris XIII and University of Le Mans

A. Alfonsi, Optimal execution and price manipulations in limit order book models, Ecole Polytechnique

A. Anantharaman, PhD Students seminar at Laboratoire Jacques-Louis Lions, University Paris VI,

S. Boyaval, weekly seminar, LIMSI

E. Cancès, Ecole Normale Supérieure de Cachan

E. Cancès, weekly seminar of the chemistry department, University of Marne-la-Vallée

I. Dabo, IMPMC seminar series, IMPMC, Paris

I. Dabo, CEA seminar series, CEA, Bruyères-le-Chatel

J.-F. Delmas, Mesures de risque en finance Centre d'Alembert, Université d'Orsay
J.-F. Delmas, Arbres en croissance, University Paris 6

A. El Hajj, Seminar of Besançon University

A. El Hajj, Seminar of Brest University

A. El Hajj, Seminar of Valenciennes University

A. El Hajj, Seminar of University Paris 13

A. El Hajj, Seminar of CMAP, Ecole Polytechnique

A. El Hajj, Seminar of Pau University

A. El Hajj, Workshop of GDR MOAD, Grenoble

A. El Hajj, Working group Inequalities and functional evolution equations, University Paris Dauphine

A. Ern, Discrete functional analysis tools for DG, University Lyon

B. Jourdain, BigMC seminar, Exact simulation of stochastic differential equations, according to Beskos, Papaspiliopoulos and Roberts

B. Jourdain, seminar of the chair financial risks, High order discretization schemes for stochastic volatility models

B. Jourdain, Petit déjeuner de la finance, Coupling index and stocks

B. Jourdain, BigMC seminar, Robust adaptive importance sampling for Normal random vectors

B. Jourdain, PDE seminar at Chambery University, Probabilistic approximation of a nonlinear parabolic PDE occuring in rheology

C. Le Bris, Colloquium Jacques Morgenstern, Sophia-Antipolis Nice

K. Minoukadeh, An Adaptive Method for Free Energy Calculations, Neuvième forum des jeunes mathématiciennes, IHP Paris

R. Roux, Groupe de Travail des Thésards, University Paris 6

R. Roux, Séminaire des doctorants, CERMICS

P. Tassi, Quelques problèmes d'hydraulique fluviale résolus avec la méthode de Galerkin discontinue, University Paris 13

P. Tassi, Quelques problèmes d'hydraulique et géomorphologie résolus avec la méthode de Galerkin discontinue, Université Paris Sud

P. Tassi, Quelques problèmes d'hydraulique fluviale et géomorphologie résolus avec la méthode de Galerkin discontinue, LNHE, EDF R&D

G. Stoltz, Adiabatic switching for degenerate ground states, weekly seminar of the University of Lille

G. Stoltz, Adaptive Importance Sampling (and applications to Bayesian statistics), seminar of the ANR BigMC, Paris

Seminar organization

A. Alfonsi, Seminar Stochastic methods and finance: every Friday from October to June

I. Dabo, L. Monasse, P. Tassi, Seminar of Scientific Computing at Cermics

K. Minoukadeh, Seminar of PhD students at Cermics

Scientific expertise

M. De Lara, member of the French Economic Council for Sustainable Development

M. De Lara, member of the Commission "Prise en compte du risque dans le calcul socioéconomique" (president Christian Gollier) by the « Centre d'analyse stratégique”

A. Ern, Hydrogeological modelling for ANDRA

Other scientific animation

M. De Lara, In charge of the French pluridisciplinary thematic network M3D supported by the Central National for Research Scientific (CNRS)

M. De Lara, In charge of the action Viable control of discrete time systems and applications, supported by the program ECOS between Chile and France

M. De Lara, In charge of the action MIFIMA, Mathematics, Informatics and Fisheries Management, supported by the regional cooperation program STIC-AmSud (CNRS, INRIA, French Foreign Affairs) between Peru, Chile and France

J.-F. Delmas, Head of the group MAS (Stochastic modelisation and statistics) for the Mathematical Society SMAI

J.-F. Delmas, Responsable of the ANR-blanc project A3 (Random trees and applications), 2009-2012

A. Ern, Director of GNR MOMAS (annual budget 250kE, task force approx. 25 men.year spread in 20 Laboratories nationwide)

B. Jourdain, deputy head of the doctoral school MSTIC, University Paris-Est

EDUCATION ACTIVITIES

SUPERVISION ACTIVITY

HdR defended

Mathématiques Appliquées et applications des mathématiques » (CNU 26), Analyse mathématique et numérique de modèles pour les matériaux, de l'échelle microscopique à l'échelle macroscopique, (Mathematical and numerical analysis of some models for materials, from the microscopic scale to the macroscopic scale), University Paris Dauphine, 3 June 2009, Ecole Doctorale Décision Informatique Mathématiques Organisation (EDDIMO).

Theses defended

Boyaval Sébastien, “Mathematical modelling and numerical simulation in materials science”, Ecole des Ponts ParisTech, 16 December 2009, Ecole Doctorale MSTIC. PhD advisors: C. Le Bris and T. Lelièvre

Galicher Hervé, « Analyse mathématique de modèles en nanophysique », Université Pierre et Marie Curie (Paris 6), 2009, Ecole Doctorale de Sciences Mathématiques de Paris Centre. PhD advisors: E. Cancès

Sbai Mohamed, Modélisation de la dépendance et simulation de processus en finance, PhD advisor: B. Jourdain, École des Ponts ParisTech, Ecole Doctorale ICMS

Sabino Piergiacomo , Monte Carlo and Quasi-Monte Carlo Methods in Option Pricing and Hedging, PhD advisors: Nicola Cufaro Petroni (Università degli Studi di Bari), B. Lapeyre (ENPC), Università degli Studi di Bari, 2 march 2009

Siri-Jegousse Arno, Study of genealogies for some population genetic models, PhD advisors: J.-F. Delmas and J.-S. Dhersin, University Paris 5, Ecole Doctorale de Sciences Mathématiques de Paris Centre (ED386).

Ongoing theses

Ahdida Abdelkoddousse, Pricing and hedging credit derivatives, PhD advisors: A. Alfonsi, B. Lapeyre, Ecole Doctorale MSTIC

Anantharaman Arnaud, Mathematical Analysis and Numerical Simulation of some Periodic Molecular and Multi-scale Models, PhD advisors: E. Cancès and G. Allaire. Ecole Doctorale MSTIC

Chalhoub Nancy, A posteriori error analysis for finite volume approximations of unsteady transport problems, PhD advisors: A. Ern and T. Sayah, UPE, Ecole Doctorale MSTIC

Costaouec Ronan, Numerical methods for homogenization: applications to random media and highly oscillatory equations, PhD advisors: C. Le Bris and F. Legoll. Ecole Doctorale MSTIC

Doyen David, Dynamic contact problems and crack propagation with cohesive forces, PhD advisor: A. Ern, Ecole Doctorale MSTIC

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

El Kass Danny, PhD advisor: R. Monneau, Ecole Doctorale MSTIC

Galicher Hervé, Analyse mathématique de modèles en nanophysique, PhD advisor : E. Cancès, Doctorat de l'Université Pierre et Marie Curie (Paris VI)

Girardeau Pierre, Résolution de grands problèmes en optimisation stochastique dynamique et synthèse de lois de commande, PhD advisor: Cohen G., Ecole Doctorale MSTIC

Henard Olivier, Multitype Random Trees, PhD advisor: J.-F. Delmas, Ecole Doctorale MSTIC

Hoscheit Patrick, Growing trees, Phd advisor: J.F. Delmas, Ecole Doctorale MSTIC

Infante Acevedo José, Numerical methods and models in market risk and financial valuations area, PhD advisors: A. Alfonsi and T. Lelièvre, Ecole Doctorale MSTIC

Jeunesse Maxence, Numerical methods in finance, PhD advisor: B. Jourdain, Ecole Doctorale MSTIC

Joubaud Rémi, Multiscale modeling of clays, PhD advisors: A. Ern and T. Lelièvre, Ecole Doctorale MSTIC

Lioris Eugénie, Study of collective taxis by discrete event simulation, PhD advisor: G.

Cohen, Ecole Doctorale MSTIC

Minoukadeh Kimiya, Deterministic and stochastic methods for molecular simulation, PhD advisors: E. Cancès and T. Lelièvre, Ecole Doctorale MSTIC

Monasse Laurent, Analysis of a discrete Element method and coupling with a compressible fluid flow method, PhD advisor: S. Piperno, Ecole Doctorale MSTIC

Roux Raphaël, Interacting particle systems: applications to molecular dynamics, PhD advisors: B.Jourdain and T. Lelièvre, Ecole Doctorale MSTIC

Rousseau Marie, Uncertainties in overland flow and erosion modeling, PhD advisor: A. Ern, Ecole Doctorale MSTIC

Siri-Jegousse Arno, Study of genealogies for some population genetic models, PhD advisor: J.-F. Delmas, and J.-S. Dhersin, University Paris 5, Ecole Doctorale de Sciences Mathématiques de Paris Centre (ED386)

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, Ecole Doctorale MSTIC

Tryoen Julie, Adaptive stochastic Galerkin methods for parametric uncertainty propagation in hyperbolic systems, PhD advisors: A. Ern and O. Le Maitre (LIMSI), Ecole Doctorale MSTIC

TEACHING ACTIVITIES

Courses at ENPC

1rst year, A. Alfonsi, B. Jourdain (Head), A. Ahdida, Probability theory and statistics

---

1rst year, M. De Lara, Modelling for the sustainable management of natural resources

---

1rst year, A. Ern (Head), G. Stoltz, P. Tassi, Scientific Computing

---

1rst year, E. Cancès (Head), A. Anantharaman, S. Boyaval, A. Ern, J.-F. Gerbeau, F. Legoll, R. Monneau, Analysis

---

1rst year, M. De Lara (Head), S. Boyaval, K. Minoukadeh, R. Costaouec R. Joubaud, Linux / Emacs / Scilab / LateX course

---

2nd year, T. Lelièvre, A. Alfonsi (Heads), Modeling, programming and simulations

---

2nd year, G. Stoltz (Head), Spectral analysis

2nd year, M. Sbai, A. Ahdida, Outils probabilistes pour la finance

---

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

---

3rd year T. Lelièvre, Deterministic methods in financial mathematics

---

3rd year ENPC and Master Recherche Mathématiques et Application, University Paris-Est Marne-la-Vallée, J.-F. Delmas and B. Jourdain (Heads), Jump processes with applications to energy markets

Courses at UPE

A. Alfonsi, « Traitement de données de marché », Master 2 finance

---

E. Burman, Constraints in Finite Element Methods, Doctoral Course UPE

J.-F. Delmas, Risk measures in finance (Cours de M2 financed by Chaire Risques financiers)

J.-F. Delmas, Stochastic models, M2

O. Henard, Mathematical tools, 3rd year at IUP-GSI

G. Stoltz, Numerical simulations and multiscale methods, Master SMCD, Ecole des Ponts ParisTech

Courses at Paris Tech

A. Alfonsi, Calibration, local volatility and stochastic, 3rd year course at ENSTA (Master MMMEF Paris I)

E. Cancès, C. Le Bris, « Analyse numérique et optimisation », PC du cours de G. Allaire et P.-L. Lions, Ecole Polytechnique

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M. De Lara, Mathematical modeling for the sustainable management of natural resource, Master EDDEE (Economie du Développement Durable, de l'Environnement et de l'Energie), AgroParisTech, Ecole Polytechnique, Mines-ParisTech, Ecole des Ponts-ParisTech, ENSTA-ParisTech, Université Paris Ouest-Nanterre, IFP School, INSTN, EHESS

J.-F. Delmas, A. Ahdida, O. Hénard, P. hoscheit, Introduction to probability and statistics, 1rst year ENSTA

J.-F. Delmas, chargé de cours, Random walks, Ecole Polytechnique

J.-F. Delmas, chargé de cours, Introduction to probability, Ecole Polytechnique

B. Jourdain, Introduction to probability theory , 1st year, Ecole Polytechnique

B. Jourdain, Stochastic numerical methods , 3rd year, Ecole Polytechnique

B. Jourdain, Projects in finance and numerical methods, 3rd year, Ecole Polytechnique

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

J. Tryoen, Practical course teaching for "Numerical Aspects in Approximation and Evolution Problems", ENSMP S1923, MINES ParisTech

Other courses

A. Ahdida, Programmation e application à la finance, Master M2, UPMLV

S. Boyaval, Numerical analysis and optimization, TD L3, ESIEE

E. Cancès, M. Lewin, Molecular simulations numerical and theoretical aspects, M2, Paris VI University

M. De Lara, “Méthodes et modèles de management durable”, Master Logistic and Supply Chain Management, ESSEC

M. De Lara, Modelling for sustainable management of natural resources, Master Mathématiques, Informatique et Applications, University Paris 1

A. Ern and D. Di Pietro, Discontinuous Galerkin methods, Master M2R Mathematics and Applications, ANEDP, UPMC

B. Lapeyre, A. Ahdida, M. Jeunesse, Finance : aspects mathématiques et numériques, 3A ENSTA

T. Lelièvre, Probabilistic numerical methods, M2, University Paris VI

K. Minoukadeh, Object Oriented Progamming: C++, cours et cours d'été University Paris 1 - Panthéon-Sorbonne

K. Minoukadeh, Numerical analysis, TP de MATLAB à l'ISBS

R. Monneau, Master lectures, Libanese University (1 week - April 2009)

P. Tassi, Numerical methods for equations in physics, ESIEE

INDUSTRIAL PARTNERSHIPS

CONTRACTS

New industrial contracts

C. Le Bris, Multiscale problems in materials science: a mathematical approach to the role of uncertainly, US Air Force (EOARD) and US Navy (ONR), 10 October 2009

ongoing industrial contracts

A. Alfonsi, B. Lapeyre, Credinext, Pricing Partners and Thomson Reuters and EcolePolytechnique, UPEMLV, INRIA

A. Alfonsi, J.-F. Delmas, B. Jourdain, B. Lapeyre, chair financial risks of the risk fundation with Ecole Polytechnique and Société Générale

A. Ern, Dynamic contact problems and crack propagation with cohesive forces, EDF R&D

R. Monneau, "Mouvement d'Interfaces, Calcul et Applications" ANR MICA 2006-2010

VALORIZATION

Software

A.Ahdida, A. Alfonsi, B. Jourdain, B. Lapeyre, Participation in the development of the PREMIA software

P. Tassi, dgC++, module for the numerical simulation of shallow water flows and bed evolution/sediment transport with applications to stratigraphy and hydraulics/hydrological modelling

PUBLIC PROGRAMMES SUPPORT

CONTRACTS REPORTS

New public contracts

J.-F. Delmas ANR-blanc A3 (Random trees and applications), Partners: ENPC, University Nancy, University Orléans, University Bordeaux, 1st February 2009

A. Ern, Multiscale modeling of clays, ANDRA

A. Ern, Uncertain models in overland flows and erosion, BRGM

Tony Lelièvre, ANR MEGAS, Its aims are to study several methods for numerical simulation, with an emphasis on sampling methods. It includes four research teams: the INRIA project IPSO in Rennes, the INRIA project SIMPAF in Lille, the eDAM team in Nancy (chemistry) 1st September 2009

E. Cancès, ANR Calcul intensif et grilles de calcul LN3M (scientist in charge F. Jollet, CEA-DAM) aims at developping new numerical methods and softwares for multiscale modeling of materials

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E. Cancès, ANR Parmat (scientist in charge Guy Bencteux (EDF)

ANR Calcul intensif et grilles de calcul, SIRE, focuses on the simulation of chemical reactivity at the interfaces, ENS Lyon, Scientist in charge Ph. Sautet

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the ARC Hybrid: this collaborative research action involves INRIA teams from Rennes (IPSO), Lille (SIMPAF), Sophia-Antiopolis (TOSCA) and our team. The purpose of the action is to study theoretical models and numerical methods mixing deterministic and stochastic aspects in the context of molecular simulation

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The GdR 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)

Ongoing public contracts

A. Alfonsi, J.-F. Delmas, B. Jourdain, B. Lapeyre, T. Lelièvre, G.Stoltz, ANR program BIG'MC with University Paris-Dauphine and group of Telecommunications schools

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A. Ern and P. Tassi, Numerical methods for shallow flows, DRAST

A. Ern and P. Tassi, ANR METHODE, University of Orleans

A. Ern, Nuclear waste storage, GNR MOMAS (ANDRA, BRGM, CEA, EDF, IRSN, PACEN/CNRS)

S. Piperno and L. Monasse, Etude du couplage Mka3d avec une méthode eulérienne, CEA and LIMSI

ACRONYMS

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**
CNES	**Centre National des Etudes Spatiales**
CNRS	**Centre National de la Recherche Scientifique**
CETMEF	**Centre d'Etudes Techniques Maritimes et Fluviales**
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**
ENSTA	**Ecole Normale Supérieure de Techniques Avancées**
ESPCI	**École Supérieure de Physique et Chimie Industrielles**
GNR	**Groupement National de Recherches sur la MOdélisation MAthématique et les Simulations numériques liées à la gestion des déchets nucléaires**
MOMAS	
EDF	**Electricité de France**
IFP	**Institut Français du Pétrole**
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**
ONERA	**Office National d'Etudes et Recherches Aérospatiales**
SMAI	**Société de Mathématiques Appliquées et Industrielles**
UPEMLV	**Université Paris-Est Marne-La-Vallée**