Activity Report 2011

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Edition: 2012-07-03
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BACCHUS Team (section vide)
2.2. Highlights

The new young Computer Graphics members who joined us this year, obtained high level papers (see New Results) and obtain two major success:

- Organize the international conference of ACM SIGGRAPH VRCAI 2011 in Hongkong;
- A cooperation project with CAS-BEGCL Imaging Technology Corporation on 3D computer animation movies.
CAGIRE Team (section vide)
CALVI Project-Team (section vide)
CONCHA Project-Team

2.2. Highlights

- Habilitation thesis of Daniela Capatina.
- Optimality of an adaptive finite element method for the Stokes equations.
- Parallelization of the CONCHA library.
DEFI Project-Team

2.2. Highlights

- In 2011 Grégoire Allaire received the Grand Prix de la Fondation d’entreprise EADS (sciences and engineering) awarded by the Académie des Sciences de Paris.
GAMMA3 Project-Team (section vide)


2.3. Highlights

- ERC Grant awarded to Erwan Faou for his project GEOPARDI
- Nicolas Crouseilles has defended his ‘Habilitation à diriger les recherches’ in January (14th January 2011).
2.2. Highlights
Th. Colin, A. Iollo, D. Lombardi and O. Saut have been nominated together with F. Cornelis and J. Palussière (Institut Bergonié) for the "prix de la Recherche" 2011 in mathematics for their results on the prediction of growth of metastasis to the lung of a distant tumor, using a time serie of CT-scan.
MICMAC Project-Team (section vide)
NACHOS Project-Team (section vide)
2.3. Highlights

We wish to highlight three results:

- **Interactive Quantum Chemistry**: we have developed what appears to be the first method for *interactive quantum chemistry*, at the ASED-MO level of theory. This should be of significant help to *e.g.* analyze and design nanosystems, as well as in chemistry education.

- **Adaptively Restrained Particle Simulations**: we have developed a rigorous method for adaptive simulation of particle systems, with potential applications in many areas of nanoscience, and beyond (particle simulations are widely used in *e.g.* computational fluid dynamics, astrophysics, computer graphics, etc.). The method has numerous advantages, and allows for the first time to rigorously and smoothly trade between precision and cost when performing a particle simulation.

- **ANR PEPSI**: NANO-D obtained a new ANR grant, called PEPSI. The PEPSI project is coordinated by Sergei Grudinin from NANO-D, and is in collaboration with Dave Ritchie at Loria and Valentin Gordeliy at IBS (Grenoble). The goal of the PEPSI project is to develop new representations of 3D protein structures, in order to calculate protein interactions extremely efficiently.

More details are available below.
2.3. Highlights

Our activity in road traffic modeling is reinforced by the doctoral thesis of M. L. Delle Monache, started in October.

Our collaboration with the SME K-Epsilon is fostered by two new contracts in the area of naval research (see Section 7.2).
2.2. Highlights

Among the significative scientific advances and successes of this year, that are illustrated by the finalization of several PhD theses, we would like to emphasize:

- The diversification and intensification of our research in the domain of ultra-sonic non destructive testing in the framework of a long term collaboration with CEA LIST. One spectacular concretization of this collaboration is the PhD thesis of S. Impériale about the modeling of piezoelectric sensors. A success in term of recognition of our activity in this fields is the acceptation of the European project.

- Several spectacular advances in the mathematical understanding of electromagnetic wave propagation in metamaterials (in the more general sense of the term and the development of corresponding numerical methods. These progresses have been successfully recognized via the ANR Project METAMATH, whose Poems is coordinator, on the thematic of metamaterials, a major topic for Poems in the forthcoming years.

- A pioneering work on the full modelization by physical models of a concert piano via the PhD thesis of J. Chabassier. This is an exemplary success of a multi disciplinary collaboration with the Unity of Mechanics at ENSTA (A. Chaigne)

Let us also mention the arrival of two new CNRS researchers, Marc Bonnet (DR) and Stéphanie Chaillat (CR), which bring new competences in the domains of integral equations and inverse problems.
PUMAS Team (section vide)
SIMPAF Project-Team (section vide)
SMASH Project-Team (section vide)
TROPICS Project-Team (section vide)
APICS Project-Team (section vide)
BIPOP Project-Team (section vide)
2.3. Highlights

1. The article “Deterministic state constrained optimal control problems without controllability assumptions”, by O. Bokanowski, N. Forcadel and H. Zidani, was “Highlight Paper” of the issue 17-04 (October 2011) of the ESAIM-COCV journal.


3. Commands team has been successful in the Marie Curie (EU) award on the project "SADCO-Sensitivity Analysis for Deterministic Controller Design", under the 7th Framework Programme “FP7-PEOPLE-2010-ITN” Grant agreement number 264735-SADCO. The project is funded 5.6MEuros over 4 years (January 2011-December 2014).
2.2. Highlights

Karim Ramdani has been promoted to Senior Researcher ("Directeur de recherche") in October 2011.
2.2. Highlights

- Silviu Iulian Niculescu obtained the Silver Medal from CNRS in December 2011.
- José Luis Avila Alonso won the Best Poster Price at the 4th DIGITEO Annual Forum.
- Benjamin Bradu won the Best PhD Price of the GDR MACS.
2.1. Highlights

- Starting from May 2011 the team has been created!
- Guilherme Afonso Mazanti, student at École Polytechnique, won the *Grand prix de stage de recherche* by École Polytechnique for his stage made in 2011 under the supervision of Yacine Chitour and Mario Sigalotti.
MAXPLUS Project-Team (section vide)
NECS Project-Team

2.2. Highlights

The most relevant events and activities for the NeCS team in 2011 are the following:

- The organization of the 3rd annual Consortium Meeting of the FeedNetBack European project, held at INRIA in Montbonnot, on October 11-12th 2011. A review meeting session and scientific presentations from peoples involved in the FeedNetBack project have been organized.
- The recruitment of a new researcher in the team: Hassen Fourati has joined the NeCS team as an UJF Associate Professor (Maître de Conférences), since September 2011.
- During 2011, the NeCS team published 28 communications in national and international conferences, 8 papers in international journals, 1 scientific book chapter, 11 research reports and 1 patent.
NON-A Team

2.3. Highlights

- The platform RobotCity has been inaugurated in April 2011 at Euratechnologies INRIA Lille;
- General public communication was achieved on cooperative robotics activities for disabled people for the project SYSIASS [109] is the ScienceDirect TOP 1 hottest article of Automatica since July 2009;
- The survey paper on delay systems [109] is the ScienceDirect TOP 1 hottest article of Automatica since July 2009;
- Technology Partnership Award 2011 of research and innovation in the Val d'Oise: Aggregation Program SDI / ECS-Lab;
- National competition Award 2011 to assist the creation of innovative technology companies, category "EMERGENCE";
- Patent pending (FR11/51604) on the control of traffic flow;
CLASSIC Project-Team (section vide)
2.2. Highlights


**Best Papers Awards:**


2.2. Highlights

- In the collaboration with the DynBio team of CNRS LEGOS at Toulouse (UMR 5566), and during the HIRESUBCOLOR contract which is ending in 2011, nonlinear methods for the generation of ocean dynamics from remote sensing have been introduced. They consist in evaluating the cascading properties of physical variables associated to turbulent flows through optimal wavelets and propagate information about the dynamics acquired at low resolution up to higher resolution. H. Yahia has been invited to the AGU (American Geophysical Union) Fall meeting in San Francisco to make a presentation of HIRESUBCOLOR results (December 5-9 2011), and to the EGU meeting to be held in Vienna in 2012. These methods are generic, and can be applied to the determination of high resolution information for ocean/atmosphere interaction. For that matter, the Oceanflux proposal has been submitted and accepted, starting November 1, 2011, and a new proposal called MULTICARO will be submitted to CNES-OSTST in 2012.
2.2. Highlights

2.2.1. Outstanding paper award at ICMI'11

Our article "Finding Audio-Visual Events in Informal Social Gatherings" [21] received the "Outstanding Paper Award" (best paper) at the IEEE/ACM 13th International Conference on Multimodal Interaction (ICMI), Alicante, Spain, November 2011. The paper is co-authored by members of both PERCEPTION and MISTIS, Xavi Alameda-Pineda, Vasil Khalidov, Radu Horaud and Florence Forbes. The paper addresses the problem of detecting and localizing audio-visual events (such as people) in a complex/cluttered scenario such as a cocktail party. The work is carried out within the collaborative European project HUMAVIPS.

MODAL Team

2.2. Highlights

Since November 2011, the team started the development of the co-clustering module in the MIXMOD software, allowing to process efficient and parsimonious generative models on huge data sets (see Section 5.1).
REALOPT Project-Team

2.2. Highlights

In the follow-up of our participation to the 2010 ROADEF/EURO challenge on a production planning application at EDF, our team has embarked this year on a research contract with EDF in collaboration with DOLPHIN. The project is quite ambitious. It requires producing a maintenance schedule for nuclear central that is robust to perturbation in maintenance duration, account for the stochastic electricity demand, and can be stably re-optimized dynamically as problem input are reviewed. In parallel we have develop a close collaboration with PUC-Rio and UFF in Brasil throught the associated team SAMBA: the project is focused on methodological developments for Branch-and-Price-and-Cut algrotihms, that shall translate into a state-of-the-art generic solver for decomposition based approaches in integer programming.

We keep up the momentum of strong papers being published in the best journals of the field (Mathematical Programming, Operations Research, Operations Research Letters, Optima, Discrete Applied Mathematics, INFORMS Journal on Computing, Computers and Operations Research, International Journal of Mathematics in Operational Research, Journal of Mathematical Modelling and Algorithms) and the most competitive conferences (such as ACM-SIAM Symposium on Discrete Algorithms (SODA)). We also contribute state-of-the-art review papers in in a reference book “Progress in Combinatorial Optimization” and received invitations as plenary speakers at international workshops.

On the team side, Cédric Joncour who completed his PhD with us in December 2010, was recruited as an assistant professor at the University of Le Havre. Gautier Stauffer obtained his HDR (Habilitation à Diriger des Recherches) for his work entitled “At Play With Combinatorial Optimization, Integer Programming and Polyhedra” in November [11].
SELECT Project-Team (section vide)
SEQUEL Project-Team

2.2. Highlights

- Renowned for its work on the topic of exploration/exploitation trade-off, SequeL members have also successfully applied their research to the “Exploration and Exploitation Challenge” organized along at the International Conference on Machine Learning (ICML’11). SequeL’s PhD students Olivier Nicol [63] and Christophe Salperwyck [65] ranked first and second respectively.
SIERRA Project-Team

2.2. Highlights

The SIERRA project-team was created on January 1, 2011.
2.3. Highlights

- DAELYAHSP Winner of the Seventh International Planning Competition (Deterministic Temporal Satisficing track) at ICAPS 2011.
- MoGo realized 20 wins out of 20 games in 7x7 Go against 10 different professional players. This is further documented in [24].
- Results in [5] (just accepted) prove that the Nash equilibrium of two-player zero-sum partially observable games is undecidable. This fundamental result notably contradicts published decidability results, which used as a decidability criterion a definition which is not equivalent to optimal play in the Nash sense.

**BEST PAPER AWARD:**
2.2. Highlights

The team co-organized the Machine Learning Summer School in Bordeaux, from September 4 to September 17 2011. This event gathered 100 participants, mostly PhD student, from 18 different countries and covered various topics (support vector machines, Monte Carlo methods, Bayesian inference, boosting, etc.) presented by world-class experts in their field. MLSS is a recurrent and important event of the machine learning community.
ASPI Project-Team (section vide)
CQFD Project-Team

2.2. Highlights

F. Dufour is scientific advisor for the C.E.A (French council for the atomic energy) in 2011.

F. Dufour has been invited to present a paper at the SIAM Conference on Control and its Applications, Baltimore, USA (July 2011).

F. Dufour has been invited to present a paper at the conference on Markov & semi-Markov Processes & Related Fields conference, Greece (September, 2011).

The ANR project ADAPTEAU has been obtained for the period 2012-2016 and will start in January 2012.
The team CQFD will organize the first french-speaking meeting on the software R in July 2012.
I4S Team

2.2. Highlights

- Prize: M. Döhler has received the IRIS PRize of Excellence 2011 in the context of european project FP7 IRIS.
2.2. Highlights

The Mathfi project is acknowledged as an active part of the Université Paris-Est “Labex” BÉZOUT which has been recently selected by the French ministry of research.

A new team called “MathRisk” based on the current Mathfi project team is being launched on the theme of mathematical treatment of risk.
REGULARITY Team (section vide)
TOSCA Project-Team (section vide)