

Curriculum Vitae

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Curriculum Vitae

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Education

1996 Ph.D. at University Paris XI, Orsay.

Title: *Dynamical Representations of Space in a Declarative Simulation Language.*

Research Lab.: L.R.I. (U.M.R. 8623 du C.N.R.S.)

Chairman: L. PUEL (LRI - U. of Orsay - Paris XI), Referees: G. BERNOT (LaMI - U. of Évry) & P. SALLÉ (ENSEEIH/INPT), Examiners: E. ASHCROFT (Arizona State University) & J.-L. GIAVITTO (LRI - CNRS), Supervisor: J.-P. SANSONNET (LRI - CNRS).

1992 DEA¹ M.I.S.I. from the University Paris VI, Versailles Saint-Quentin.

Research Masters thesis : "A software framework for the experimentation of parallel simulation algorithms: applications to Time-Warp", supervisor V. VÈQUE (LRI).

Positions

September 2000 *Associate Professor* at University of Évry.

September 1997 *Assistant Professor* at University of Évry.

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¹The French DEA is an A+5 research oriented degree from University and a pre-requisite for Ph.D studies. The training period for the DEA degree is concluded by a research Masters thesis.

1 Research Activities

My research activities are focused on *declarative languages* and are centered on the following two directions:

1. dynamicity and time-representation (1992-2000),
2. the development of topological data-structures for the simulation of dynamical systems with a dynamic structure (2000-).

1.1 1992-2000: Introducing Dynamicity in the $\mathcal{S}_{1/2}$ Programming Language

The principal aim of the $\mathcal{S}_{1/2}$ project² was the definition of a high-level parallel declarative computation model for the simulation of large dynamical systems. This computation model has been materialized by the development of a programming language also called $\mathcal{S}_{1/2}$, and has been validated by a set of experimentation platforms (interpreter, compiler, visualizing tool, workbench for the data distribution strategies, etc.) My work has focused on the definition, the study and the development of dynamical representations of space within a declarative framework.

I have introduced in $\mathcal{S}_{1/2}$ two new data structures, *GBF* and *amalgams*, by proposing a formalization and studying their implementation. GBF (group-based data-fields) allow the definition of regular and homogeneous spaces, while the amalgams allow the construction, through some computations, of heterogeneous and *ad-hoc* spaces. These two new notions have direct applications in the domain of simulation of highly dynamical systems (as for example growing processes in biology). They also find a direct application in computer science by defining a new framework for (1) the definition, analysis and implementation of recursive data (the GBF define for example a unified framework encompassing the notion of array and tree); (2) the definition and formalization of new incremental programming mechanisms that were arising then in languages like Java (amalgams allow the formalization of an instantiation mechanism by implicit name capture, and program extension) and (3) allow a declarative construction of data-flow graphs. I first studied GBF and amalgams on their own and they have been afterwards introduced and integrated into the declarative framework of the language $\mathcal{S}_{1/2}$ to define the language $\mathcal{S}_{1/2\mathcal{D}}$.

In that work, I have shown, through numerous and significant examples, the pertinence of the choices made. They put into evidence the gain of expressiveness brought by the improvement of the notion of space, and by the primitives allowing the definition of objects onto those spaces. The notions of GBF and Amalgam allow the definition, in a very concise manner, of regular and irregular data structures, within a declarative framework, and open some new perspectives for the parameterization and the incremental construction of declarative programs.

1.2 2000- : The MGS Project

1.2.1 The Context of the Project

My current research activities take place in the MGS project³. This project evolves following two complementary directions:

1. to study and develop the integration of topological notions and tools in programming languages;
2. to apply those notions and tools to the conception and development of new data- and control-structures that are expressive and efficient for the modeling and simulation of dynamical systems with a dynamic structure.

This research is concretized by the development of an eponymous experimental programming language and its application to the modeling and simulation of dynamical systems. We have a particular focus in the field of biology and morphogenesis.

1.2.2 High-level Domain Specific Programming Languages

My research work in that domain focuses on the definition of new data- and control- structures allowing the representation of spatial and temporal data for the modeling and simulation of dynamical systems in a rigorous framework, close to the end-user and the mathematical tools used in that domain (dynamical systems in biology, chemistry and physics).

The two main applications domains that have motivated the development of these new mechanisms are the analysis and representation of complex relations (for example spatial ones) and the simulation of dynamical systems where the structure has to be computed jointly with the evolution of the system (as it is the case in developmental biology, at any level from the cells to the individuals).

²The web site of the project is: <http://www.ibisc.univ-evry.fr/pub/Otto/>

³The home page of the project, where the language interpreters are available is <http://mgs.ibisc.univ-evry.fr>

A privileged application domain was the modeling and simulation in systemic biology (more specifically in post-genomic and in integrative simulation of developmental processes). We are now (since 2007) considering the modeling, simulation and conception of new computational resources brought by nanosciences and molecular biology.

This research is based on the development of a new computation paradigm (by generalizing the approaches of the chemical computing, membrane computing, Lindenmayer systems and cellular automata) and new tools for the interpretation, typing and efficient compilation of declarative languages. This research meets the fields of the “self-*” (self-sustaining, self-healing, self-organizing) systems that are emerging in the software community and whose long-term goal is to identify and develop in today’s computers the fundamental requirements to ensure properties of flexibility, adaptivity, robustness, self-healing that are common to the complex systems of living matter.

2 Teaching Activities and Student Supervision

2.1 Teaching Activities

Since 1997, I have taught each year between 192h and 240h (for a total for the last 8 years of over 1600 hours), but for 2006 and 2007, since I was on sabbatical⁴. My teaching covers the following domains and levels:

- 2nd year at University (“DEUG SDM”): the C language,
- 2nd year at University (“DEUG MIAS”): Unix, operating system, network, development tools,
- 3rd year at University (“IUP-Miage”): logics, human-computer interaction,
- 3rd year at University (“Licence de Mathématiques”): data structure and algorithms,
- 3rd year at University (“Licence Informatique”): logics, functional programming, compilation,
- 4th year at University (“Maitrise Informatique”): λ -calculus, combinatory logics,
- 5th year at University (“DEA Informatique”): basic mathematics for the computer scientist, advanced programming, data-parallelism, unconventional languages, dynamical systems,
- 5th year at Engineer School ENSIIE (“Mastere Bio-Informatique”): modeling and simulation.

I also took part in 2003 in a mission of teaching at Bobo-Dioulasso (Burkina Faso, Africa) where I gave two lectures: one for 21 hours of mathematics and functional programming; one for 10.5 hours of logics.

2.2 Supervision of MsC Theses

I supervised the work of many Masters (DEA) trainees or 3rd year of engineer school:

2.2.1 Masters Theses with a Specific Computer Science Focus

1. S. OUTERBAH, 1998, “Introduction d’une notion de référence distante dans un formalisme de capture de noms et implémentation d’une plate-forme d’expérimentation”, D.E.A. Informatique, 100% supervision.
2. E. DELSINNE, 2002, “Structures de données indexées par un groupe, isomorphismes de GBF abéliens et extensions aux structures automatiques”, E.N.S. Cachan and University of Rennes-I, 50% supervision.
3. V. LARUE, 2002, “Structures de données indexées par un groupe : représentation graphique et extension au cas non abélien”, D.E.A. INFO, 100% supervision.
4. A. SPICHER, 2003, “Typage et compilation de filtrage de chemins dans des collections topologiques”, D.E.A. AMIB, 100% supervision.
5. F. THONNÉRIEUX, 2003, “Réalisation d’une interface graphique pour le traitement des sorties du programme MGS”, IIE, 100% supervision.
6. L. PERRET, 2005, “Intégration des types de données algébriques dans MGS”, École Centrale Paris, 100% supervision.
7. Y. JULLIAN, 2005, “Conception et développement d’un éditeur graphique de filtre pour MGS”, IIE, 100% supervision.

2.2.2 Masters Theses with a Specific Bio-Computing Focus

1. J.-V. SEGARD, 1997, “Modèles de morphogénèse biologique dans un langage déclaratif de simulation”, D.E.A. of Cognitive Science of L.I.M.S.I, U.P.R. 3251 du C.N.R.S, 50% supervision.
2. N. MANN, 2004, “Hyperstructures et modélisation de chimie artificielle dans le langage MGS”, D.E.A. AMIB, 100% supervision.
3. D. BOUSSIÉ, 2004, “Simulation en MGS du déplacement du spermatozoïde du nématode *Ascaris Suum*”, D.E.A. AMIB, 100% supervision.

⁴The sabbatical took the form of a “delegation CNRS” for 2005-2006 and 2006-2007.

4. F. GAUBERT, 2005, “Simulation stochastique et modélisation de chimie artificielle dans le langage MGS”, D.E.A. AMIB, 100% supervision.
5. C. KALETA, 2007, “Outils de visualisation pour la simulation de systèmes dynamiques à structure dynamique”, Erasmus M1 student in Computer Science, Universität Jena & Université d’Évry.

2.3 Supervision of Ph.D.

I supervised for 100% the scientific work of 2 Ph.D. students⁵. These students are:

- J. COHEN, 2004, “Intégration des collections topologiques et des transformations dans un langage fonctionnel”. J. COHEN is now assistant professor at the University of Nantes.

J. COHEN has participated in the development of an interpreter for the MGS language using a higher-order abstract syntax scheme and in the definition of a generic pattern matching algorithm for the topological collections. He also developed a typing strategy for a sub-part of the language.

- A. SPICHER, 2006, “Transformation de collections topologiques de dimension arbitraires. Application à la modélisation de systèmes dynamiques”. A. SPICHER is now a post-doc at INRIA Lorraine.

A. SPICHER has developed a large number of applications of MGS in the biological domain. He has also done a great deal of theoretical work in the definition of a general formalization of the notion of topological collection based on abstract combinatorial topology and a probabilistic semantics for MGS.

2.4 Ph.D. Committee

I was one of the examiners of the Ph.D. thesis jury of A. MERLIN with H. THUILLIER (chairman), R. Di COSMO & E. VIOLARD (referees), Q. MILLER (examiner), G. HAINS (supervisor). The defense took place in 2004, december the 7th at the LIFO, University of Orléans.

⁵under the administrative responsibility of Jean-Louis GIAVITTO, Research Director at CNRS.

3 Scientific Collaborations

The French scientific community in computer science is structured around national working groups in various research fields. The exact administrative structure varies in time and has been called AS, GDR, PRC, etc.

3.1 Past Collaborations and Scientific Involvement

My past scientific activities included:

- The members of the 8_{1/2} project participated to the “PRC GDR C3” and then to “PRS” and more precisely to the working group “ParaDe” directed by L. BOUGÉ.
- The 8_{1/2} project took part in the new “GDR de Programmation”, parallelism working group.
- In 1997-2000, we set up with F. DELAPLACE from the LaMI, and with J.-L. GIAVITTO, F. CAPPELLO and C. GERMAIN from the LRI, a working group on “*Meta-Computing and Distributed High-Performance Computation*”.
- I am a former member of the “GDR ALP” with the proposition of the working group “LODEC” (Languages and Tools for Deduction under Constraints) in the action “parallel and concurrent programming using logical and functional languages and debugging tools”.
- I was a member of the editorial board of the French computer-science journal TSI, from 1998 to 2002.
- I served as PC in the following conferences: CC’99, CC’00, JFLA’04, RULE’04.
- I was a member of the CNRS AS “Topologie et Calcul” lead by E. GOUBAULT (CEA),
- I was a member of the CNRS AS “Nouveaux Modèles et algorithmes de graphes pour la biologie” lead by M. HABIB (LIRMM).
- I was a member of the CELLIA working group at IBISC; I take part to the working group “Simulation en génomique : vers l’épigénèse” and “Synthetic Biology” hosted by genopole[®].
- I was the head of the PC for the sixteenth edition of the JFLA (in 2005), the only French conference on applicative languages.

3.2 Involvement in ACI and ANR Programs

I am currently involved in the following ACI and ANR programs:

- I am the member of the ACI IMPBIO project “VICANNE” headed by J.-P. MAZAT.
- I co-organized with J.-P. BANÂTRE, P. FRADET and J.-L. GIAVITTO, the conference UPP’04 (Unconventionnal Programming Paradigms). This conference received some support by the EEC (IST program) and the NSF. Its goal was to gather for three days researchers in the field of unconventional programming (*bio-inspired computing, chemical computing, amorphous computing, generative programming and autonomic computing*).
- I co-organized in July, 18th, with F. GRUAU (LRI) and H. BERRY (INRIA FUTURS) a one day workshop on *Amorphous Computing*, with D. COORE, one of the founder of that computation model. The web page of the workshop is <http://amorphous.ibisc.univ-evry.fr/>
- I am the head of an ACI “*Jeune Chercheur*” since 2004, “NANOPROG : une approche langage pour le nanocalcul et la simulation des nanosystèmes biologiques”; other participants include J. COHEN, and A. SPICHER of the IBISC Lab, and F. GRUAU of the LRI Lab.
- I am part of the “ANR blanche AUTOCHEM” headed by T. PRIOL (IRISA) with J.-P. BANÂTRE (IRISA), P. FRADET (INRIA Grenoble), J.-L. GIAVITTO (IBISC - U. of Évry), H. KLAUDEL (IBISC - U. of Évry), A. SPICHER (LORIA), T. COLLETTE (CEA LIST), C. GAMRAT (CEA) and V. DAVID (CEA).
- I am an *advisor* (with A. SPICHER) in the French (Paris) team for the iGEM’07 international competition on *Synthetic Biology*. The website of iGEM’07 is <http://parts.mit.edu/r/parts/igem/index.cgi>
- I am maintaining with S. BOTTANI (MSC - University Paris 7) two web sites on Synthetic Biology for the French community: <http://sb.ibisc.fr/> and <http://www.ibisc.univ-evry.fr/pub/pmwiki/pmwiki.php>

3.3 “Delegation CNRS”

In 2005–2006 and 2006–2007 I was the recipient of a “Delegation CNRS”. During those two years, I have visited many of my collaborators using my grant “ACI NANOPROG”.

During the first year of the delegation, I was still in charge of the administrative responsibility of the first Masters year (“M1”) at the University of Évry.

3.4 International Collaborations

I have international collaborations with:

- P. PRUSINKIEWICZ, University of Calgary, Canada, Dpt of Computer Science. Since 2000, we have met a couple of times and are working on the problem of spatial representations in programming language and the specification of dynamical systems with a dynamical structure.
- G. MALCOLM, University of Liverpool, U.K, Dpt of Computer Science. We are collaborating on the study of the rewriting systems for the modeling of biological systems.
- M. GHEORGHE, University of Sheffield, U.K, Dpt of Computer Science. We are working on formal aspects of languages for bio-computing (P systems, molecular X machines, ...).
- P. DITTRICH, Universität Friedrich-Schiller, Jena, Germany, Bio Systems Analysis Group. We have started a collaboration in the use of MGS for the representation in artificial chemistry of his notion of *organizations*. I have visited the U. of Jena for 2 weeks.
- D. COORE, University of the West Indies, Jamaica, Dept of Computer Science. We have initiated in 2007 a collaboration on the definition of a new programming languages based on the notions developed in *amorphous computing* and aimed at defining the behaviour of large population of asynchronous, unreliable, local communicating *living matter*. D. COORE has come for one month as a visiting Professor in Évry in July 2007.

3.5 National Collaborations

I have national collaborations with:

- C. GODIN, AMAP team, Modeling Plants unit, CIRAD-INRA-INRIA on problems of computer multi-scale representations in languages. MGS has been used in the Ph.D. thesis of C. GODIN’s student P. BARBIER and lead to a publication in the PNAS.
- I took part in the “Plan Pluri Formation (PPF)” between the University of Évry and the University of Poitiers on “Méthode et outils formels pour l’animation de modèles topologiques et géométriques. Application à la simulation en post-génomique”, 2002-2005. I participated to the study of the use of G-maps for simulation in biology.
- H. BERRY of the ALCHEMY team, INRIA/PCRI of L.R.I, University Paris XI on the computational properties of a programmable material in the field of synthetic biology.
- P.-E. MOREAU, INRIA Lorraine. We have been working together during J. COHEN’s Ph.D.’s work on associative-commutative matching developed in the ELAN project.
- F. JACQUEMARD of L.S.V./INRIA on the exploration of large state space in the field of cryptographic protocols and the use of topological tools for the representation and composition of musical scores.

4 Administrative Tasks

In our growing University, administrative tasks are required at two levels: for the research lab and for the teaching department. I take part in both as described below.

4.1 Research Lab

At the level of the research lab, I am very involved in all regular tasks. Among them, I take part in:

- I am a former member of the “CARI” (*Center for Administration of Computer Resources*) of the University of Évry where I represented the laboratory from 1997 to 2002.
- I am a member of the “Laboratory Council” since 2000 where I represent the assistant/associate professors.
- Since 1997 I am a member of the *hardware and software* commission of the lab where we define and manage the computer resources of the lab.

4.2 Teaching Department

Since the beginning of our teaching department, we are lacking administrative help. For that reason, we have to manage the department by ourselves. Among the various activities in which I took part, I can cite:

- I am a member, since 2000, of the “commission de spécialistes” (this commission reviews and hires the faculty members in computer science) where I represent the assistant/associate professors.
This year, I am the “vice-president” of the commission for the assistant/associate professors (“collège B”).
- During 3 years, I was in charge of the 4th-year courses in computer science at the University (“Maîtrise Informatique”).
- I am this year in charge of the 3rd-year courses in computer science at the University (“L3 Informatique”).

Each time, it involves various tasks like finding teaching assistants for the courses, making the course schedules, interact with the administrative staff for setting-up the jurys, reviewing the student applicants files, updating the “règlements du contrôle des connaissances”, ...

I also took part to the LMD-committee which produced the new teaching structure based on the LMD structure: “Master Sciences et Ingénierie, mention Informatique et Systèmes”. This team effort required a great deal of work since we had to re-think the whole structure of the teaching activities, from scratch.

4.3 Administration of Computer and Network resources: 1998-2002

From the end of 1998 to the beginning of 2002, I have managed **all alone** all the computer resources and network of the research lab (computers, X terminals, printers, active network resources, ...) and the common services (home account savings, e-mail, DNS, ftp, web server, ...). In 2000, the lab has moved from its previous location to its current one: I had to define all the new system architecture from network organization to the distribution/update of computer operating systems and software (Linux and Windows). After 2002, I have supervised the activity of E. FAURE, our system engineer.

5 Software Developments, Publications and Communications

My research has always been organized in two parts: theoretical work embedded into concrete development of software tools, models and languages.

5.1 Software Developments

I took part in the following software developments, which are all open-sources projects:

- the $8_{1/2}$ programming language, available at <http://www.ibisc.univ-evry.fr/pub/Otto/> and consists in over 36k lines of ML and C source code,
- a distributed version of the amalgam formalism, available at <http://www.ibisc.fr/~michel/amalgame.tar.gz> and consists in about 3k lines of ML and C source code,
- the MGS programming language, available by request at <http://mgs.ibisc.univ-evry.fr> and consists in over 50k lines of ML, C++ and C source code; it includes many external libraries (qhull for the computation of Delaunay and Voronoï tessellations, GNU gsl for various random numbers generators, nauty for the computation of graph isomorphisms, ...)

5.2 International Journals

In each section, publications are sorted by alphabetic order using the first author as the key, then in chronological order. All publications are available at the url <http://www.ibisc.univ-evry.fr/~michel/WWW/bib.html>

- [J1] **Olivier Michel**. Design and implementation of $8_{1/2}$, a declarative data-parallel language. *Computer Languages*, 22(2/3):165–179, 1996. special issue on Parallel Logic Programming.
- [J2] Jean-Louis Giavitto and **Olivier Michel**. The topological structures of membrane computing. *Fundamenta Informatica*, 49:107–129, 2002.
- [J3] Patrick Amar, Pascal Ballet, Georgia Barlovatz-Meimon, Arndt Benecke, Gilles Bernot, Yves Bouligand, Paul Bourguine, Franck Delaplace, Jean-Marc Delosme, Maurice Demarty, Itzhak Fishov, Jean Fourmentin-Guilbert, Joe Fralick, Jean-Louis Giavitto, Bernard Gleyse, Christophe Godin, Roberto Incitti, François Képès, Catherine Lange, Lois Le Sceller, Corinne Loutellier, **Olivier Michel**, Franck Molina, Chantal Monnier, René Natowicz, Vic Norris, Nicole Orange, Helene Pollard, Derek Raine, Camille Ripoll, Josette Rouviere-Yaniv, Milton Saier, Paul Soler, Pierre Tambourin, Michel Thellier, Philippe Tracqui, Dave Ussery, Jean-Claude Vincent, Jean-Pierre Vannier, Philippa Wiggins, and Abdallah Zemirline. Hyperstructures, genome analysis and I-cells. *Acta Biotheoretica*, 50, 2002.
- [J4] Jean-Louis Giavitto, **Olivier Michel**, and Julien Cohen. Pattern-matching and rewriting rules for group indexed data structures. *ACM SIGPLAN Notices*, 37(12):76–87, December 2002.
- [J5] Jean-Louis Giavitto, **Olivier Michel**, and Franck Delaplace. Declarative simulation of dynamical systems: the $8_{1/2}$ programming language and its application to the simulation of genetic networks. *BioSystems*, 68(2–3):155–170, feb/march 2003.
- [J6] Jean-Louis Giavitto and **Olivier Michel**. Modeling the topological organization of cellular processes. *BioSystems*, 70(2):149–163, 2003.
- [J7] Jean-Louis Giavitto and **Olivier Michel**. Modeling the topological organization of cellular processes. *Physics of Life*, August(3), 2003. See <http://www.physicsoflife.com/index.html>. (“Physics of Life” is an Elsevier electronic Journal selecting articles that have been published in 22 contributing journals from Elsevier Science, covering Physics, Biology, Chemistry and Medicine with a focus on biological physics research).
- [J8] Jean-Louis Giavitto, Grant Malcolm, and **Olivier Michel**. Rewriting systems and the modelling of biological systems. *Comparative and Functional Genomics*, 5:95–99, February 2004.
- [J9] Antoine Spicher and **Olivier Michel**. Declarative modeling of a neurulation-like process. *BioSystems*, 87:281–288, February 2006.
- [J10] **Olivier Michel**, Jean-Pierre Banâtre, Pascal Fradet, and Jean-Louis Giavitto. Challenging questions for the rationales of non-classical programming languages. *International Journal of Unconventional Computing*, 2006.

- [J11] Antoine Spicher, **Olivier Michel**, Mikolaj Cieslak, Jean-Louis Giavitto, and Przemyslaw Prusinkiewicz. Stochastic P systems and the simulation of biochemical processes with dynamic compartments. *BioSystems*, In press, 2007.

The two following publications are in a French journal, *Technique et Science Informatique* (Computer Science and Technique).

- [J12] Jean-Louis Giavitto, **Olivier Michel**, Jean-Pierre Banâtre, and Pascal Fradet. Modèles de programmation non-conventionnels. *Technique et Science Informatique*, 23:177–186, 2004. Compte-rendu de l’atelier international UPP’04. (not reviewed)
- [J13] Antoine Spicher and **Olivier Michel**. Représentation et manipulation de structures topologiques dans un langage fonctionnel. *Technique et Science Informatique*, 2007.

5.3 Edition

I have been the (co-)editor of two conference proceedings and one special issue in a journal:

- [E1] Jean-Pierre Banâtre, Pascal Fradet, Jean-Louis Giavitto, and Olivier Michel, editors. *Unconventional Programming Paradigms (UPP’04)*, volume 3566 of *LNCS*, Le Mont Saint-Michel, France, September 2005. ERCIM – NFS, Springer Verlag. Revised, selected and invited papers. 367 p. ISBN: 3-540-27884-2. <http://www.springeronline.com/3-540-27884-2>.
- [E2] Olivier Michel and Pierre Weis, editors. *Seizièmes Journées Francophones des Langages Applicatifs (JFLA’05)*, number 16. INRIA, 2005. <http://jfla.inria.fr/2005/actes/actes-jfla-2005.tgz>.
- [E3] Langages applicatifs, théorie et applications. *Technique et Science Informatique*, Hermes Science, In press. 2007.

5.4 Book Chapters

- [B1] A. Zemirline, P. Ballet, L. Marcé, P. Amar, P. Ballet, G. Bernot, F. Delaplace, Jean-Louis Giavitto, **Olivier Michel**, J.-M. Delosme, R. Incitti, P. Bourguine, C. Godin, F. Képès, P. Tracqui, V. Noris, J. Guespin, M. Demarty, and C. Ripoll. *Modelling and Simulation of biological processes in the context of genomics*, chapter “Cellular-automata, Reaction-Diffusion and Multiagents Systems for Artificial Cell Modelling”. Hermes, July 2002. Also published as a tutorial chapter of the proceedings of the workshop “Modélisation et simulation de processus biologiques dans le contexte de la génomique”, 17-21 mars 2002, Autran, France.
- [B2] Jean-Louis Giavitto, Christophe Godin, **Olivier Michel**, and Przemyslaw Prusinkiewicz. *Modelling and Simulation of biological processes in the context of genomics*, chapter “Computational Models for Integrative and Developmental Biology”. Hermes, July 2002. Also republished as an high-level course in the proceedings of the Dieppe spring school on “Modelling and simulation of biological processes in the context of genomics”, 12-17 may 2003, Dieppes, France.
- [B3] Jean-Louis Giavitto and **Olivier Michel**. *Molecular Computational Models: Unconventional Approaches*, chapter Modeling Developmental Processes in MGS, pages 1–46. Idea Group, 2004.
- [B4] **Olivier Michel** and Florent Jacquemard. *An Analysis of a Public-Key Protocol with Membranes*, pages 281–300. Natural Computing Series. Springer Verlag, 2005.

5.5 Publications in International Conferences (with review)

- [IC1] **Olivier Michel** and Jean-Louis Giavitto. Design and implementation of a declarative data-parallel language. In *post-ICLP’94 workshop W6 on Parallel and Data Parallel Execution of Logic Programs*, S. Margherita Liguria, Italy, 17June 1994. Uppsala University, Computing Science Department.
- [IC2] **Olivier Michel**, Jean-Louis Giavitto, and Jean-Paul Sansonnet. A data-parallel declarative language for the simulation of large dynamical systems and its compilation. In Institute for System Programming of the Russian Ac. of Sci., editor, *SMS-TPE’94: Software for Multiprocessors and Supercomputers*, Moscow, 21–23 September 1994. Office of Naval Research USA & Russian Basic Research Foundation.

- [IC3] Jean-Louis Giavitto, **Olivier Michel**, and Jean-Paul Sansonnet. Group based fields. In I. Takayasu, R. H. Jr. Halstead, and C. Queindec, editors, *Parallel Symbolic Languages and Systems (International Workshop PSLs'95)*, volume 1068 of *Lecture Notes in Computer Sciences*, pages 209–215, Beaune (France), 2–4 October 1995. Springer-Verlag.
- [IC4] **Olivier Michel**, Dominique De Vito, and Jean-Paul Sansonnet. $8_{1/2}$: data-parallelism and data-flow. In E. Ashcroft, editor, *Intensional Programming II: Proc. of the 9th Int. Symp. on Lucid and Intensional Programming*. World Scientific, May 1996.
- [IC5] **Olivier Michel**. Introducing dynamicity in the data-parallel language $8_{1/2}$. In Luc Bougé, Pierre Fraigniaud, Anne Mignotte, and Yves Robert, editors, *EuroPar'96 Parallel Processing*, volume 1123 of *Lecture Notes in Computer Sciences*, pages 678–686. Springer-Verlag, August 1996.
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- [IC8] Jean-Louis Giavitto, Dominique De Vito, and **Olivier Michel**. Semantics and compilation of recursive sequential streams in $8_{1/2}$. In H. Glaser and H. Kuchen, editors, *Ninth International Symposium on Programming Languages, Implementations, Logics, and Programs (PLILP'97)*, volume 1292, pages 207–223, Southampton, 3-5 September 1997.
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- [IC10] Jean-Louis Giavitto and **Olivier Michel**. MGS: Implementing a unified view on four biologically inspired computational models. In *Pre-proceedings of WMC-CdeA 2001 (Workshop on Membrane Computing, Curtea de Arges)*. Research Report 17/01 of the Universitat Rivira I Virgili, Tarragona, Spain, August 2001.
- [IC11] Jean-Louis Giavitto and **Olivier Michel**. MGS: a rule-based programming language for complex objects and collections. In Mark van den Brand and Rakesh Verma, editors, *Electronic Notes in Theoretical Computer Science*, volume 59. Elsevier Science Publishers, 2001.
- [IC12] Jean-Louis Giavitto and **Olivier Michel**. Declarative definition of group indexed data structures and approximation of their domains. In *Proceedings of the 3rd International ACM SIGPLAN Conference on Principles and Practice of Declarative Programming (PPDP-01)*. ACM Press, September 2001.
- [IC13] Jean-Louis Giavitto and **Olivier Michel**. Accretive rules in Cayley P systems. In *Pre-proceedings of WMC-CdeA 2002 (Workshop on Membrane Computing, Curtea de Arges)*. MolCoNet european network 2002-1, August 2002.
- [IC14] Jean-Louis Giavitto and **Olivier Michel**. Pattern-matching and Rewriting Rules for Group Indexed Data Structures In *ACM - Rule'02, Pittsburgh (USA)*, October 2002.
- [IC15] Jean-Louis Giavitto and **Olivier Michel**. Data Structure as Topological Spaces. In *Proceedings of the 3rd International Conference on Unconventional Models of Computation UMC02*. October 2002, Himeji, Japan. LNCS 2509.
- [IC16] Jean-Louis Giavitto, **Olivier Michel**, and Julien Cohen. Accretive rules in cayley P systems. In Gh. Paun, G. Rozenberg, A. Salomaa, and C. Zandron, editors, *Membrane Computing 2002*, pages 319–338. Springer, 2003. LNCS 2597.
- [IC17] **Olivier Michel** and Florent Jacquemard. An analysis of the needham-schroeder public-key protocol with MGS. In G. Mauri, G. Paun, and C Zandron, editors, *Preproceedings of the Fifth workshop on Membrane Computing (WMC5)*, pages 295–315. EC MolConNet - Universita di Milano-Bicocca, June 2004.
- [IC18] Antoine Spicher, **Olivier Michel**, and Jean-Louis Giavitto. A topological framework for the specification and the simulation of discrete dynamical systems. In *Sixth International conference on Cellular Automata for Research and Industry (ACRI'04)*, volume 3305 of *Lecture Notes in Computer Sciences*, pages 238–247, LNCS, Amsterdam, October 2004.

- [IC19] Antoine Spicher and **Olivier Michel**. Declarative modeling of a neurulation-like process. In *Sixth International Workshop on Information Processing in Cells and Tissues*, 2005.
- [IC20] Antoine Spicher and **Olivier Michel**. Using rewriting techniques in the simulation of dynamical systems: Application to the modeling of sperm crawling. In *Fifth International Conference on Computational Science (ICCS'05)*, volume I, pages 820–827, 2005.
- [IC21] Jean-Louis Giavitto, **Olivier Michel**, and Antoine Spicher. Computation in space and space in computation. In J.-P. Banâtre, P. Fradet, Jean-Louis Giavitto, and **Olivier Michel**, editors, *Unconventional Programming Paradigms (UPP'04)*, number LNCS 3566, pages 137–152. ERCIM–NSF, Springer Verlag, 2005.
- [IC22] Antoine Spicher, **Olivier Michel**, and Jean-Louis Giavitto. Algorithmic self-assembly by accretion and by carving in MGS. In *7th International Conference on Artificial Evolution*, 2005.

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- [C1] Jean-Louis Giavitto, Jean-Paul Sansonnet, and **Olivier Michel**. Inférer rapidement la géométrie des collections. In *Workshop on Static Analysis, Bordeaux*, 1992.
- [C2] Jean-Louis Giavitto and **Olivier Michel**. Calcul distribué de champs de données. In P. Weis, editor, *Journées Francophones des Langages Applicatifs (JFLA99)*, Avoriaz, February 1999. INRIA.
- [C3] Jean-Louis Giavitto and **Olivier Michel**. Un cadre pour la définition récursive de données. In C. Dubois, editor, *Journées Francophones des Langages Applicatifs (JFLA00)*, Mont Saint-Michel, February 2000. INRIA.
- [C4] **Olivier Michel**, Jean-Louis Giavitto, and Julien Cohen. MGS : transformer des collections complexes pour la simulation en biologie. In L. Rideau, editor, *Journées Francophones des Langages Applicatifs (JFLA02)*, Anglet (France), January 2002. INRIA.
- [C5] Antoine Spicher and **Olivier Michel**. Stratégie d'application stochastique de règles de réécritures dans le langage MGS. In *Journées Francophones des Langages Applicatifs*. INRIA, 2006.
- [C6] Antoine Spicher and **Olivier Michel**. Manipulations de structures topologiques dans un langage déclaratif pour la simulation. In *11ème Journées du GT "Animation et Simulation" (GTAS'2004)*, Reims, juin 2004. AFIG et LERI, Université de Reims.

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- [R2] **Olivier Michel** and Jean-Louis Giavitto. Amalgams: Names and name capture in a declarative framework. Technical Report 32, LaMI – Université d'Évry Val d'Essonne, January 1998. also available as LRI Research-Report RR-1159.
- [R3] Jean-Louis Giavitto and **Olivier Michel**. MGS: a programming language for the transformations of topological collections. Technical Report 61-2001, LaMI – Université d'Évry Val d'Essonne, May 2001.
- [R4] Jean-Louis Giavitto and **Olivier Michel**. The topological structures of membrane computing. Technical Report 70-2001, LaMI – Université d'Évry Val d'Essonne, November 2001.
- [R5] Jean-Louis Giavitto, Christophe Godin, **Olivier Michel**, and Przemyslaw Prusinkiewicz. Computational models for integrative and developmental biology. Technical Report 72-2002, LaMI – Université d'Évry Val d'Essonne, March 2002. draft version of [?].
- [R6] Jean-Louis Giavitto, **Olivier Michel**, and Julien Cohen. Pattern-matching and rewriting rules for group indexed data structures. Technical Report 76-2002, LaMI – Université d'Évry Val d'Essonne, June 2002.
- [R7] **Olivier Michel**, Florent Jacquemard, and Jean-Louis Giavitto. Three variations on the analysis of the needham-schroeder public-key protocol with MGS. Technical Report LaMI-98-2004, LaMI – Université d'Évry - CNRS, May 2004. 25 p.
- [R8] Antoine Spicher, **Olivier Michel**, and Jean-Louis Giavitto. A topological framework for the specification and the simulation of discrete dynamical systems. Technical Report LaMI-99-2004, LaMI, May 2004.

- [R9] Jean-Louis Giavitto, Antoine Spicher and **Olivier Michel**. Topological Rewriting and the Geometrization of Programming. Technical Report IBISC-XX-2007, IBISC, September 2007.

5.8 Other Publications

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- [O4] **Olivier Michel**. The $8_{1/2}$ reference manual. December 1995.
- [O5] Jean-Paul Sansonnet, Jean-Louis Giavitto, **Olivier Michel**, Abderhamane Mahiout, and Dominique De Vito. Rapport d'activité du thème $8_{1/2}$. rapport final d'activité à destination du G.D.R. de Programmation, (10p.), January 1996.
- [O6] Jean-Paul Sansonnet, Jean-Louis Giavitto, **Olivier Michel**, Abderhamane Mahiout, and Dominique De Vito. Rapport d'activité du thème $8_{1/2}$ – $8_{1/2}$: Modèles et outils pour les grandes simulations. rapport interne (45p.), January 1996.
- [O7] **Olivier Michel**. Les amalgames : un mécanisme pour la structuration et la construction incrémentielle de programmes déclaratifs. In *Journées du GDR Programmation*, Orléans, 20–22 September 1996. GDR Programmation du CNRS.
- [O8] Jean-Louis Giavitto, **Olivier Michel**, and Julien Cohen. *Une présentation du langage MGS*. LaMI, université d'Évry, May 2002. (tutoriel).
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5.9 Theses

- [T1] **Olivier Michel**. *Représentations dynamiques de l'espace dans un langage déclaratif de simulation*. Ph.D. thesis, Université de Paris-Sud, centre d'Orsay, December 1996. N°4596, (in French).

5.10 Masters and Ph.D. Theses under my Supervision

- [MT1] Jean-Vincent Segard. Modèles de morphogénèse biologique dans un langage déclaratif de simulation. Masters thesis, D.E.A. de Sciences Cognitives du L.I.M.S.I, 1997.
- [MT2] Sami Outerbah. Introduction d'une notion de référence distante dans un formalisme de capture de noms et implémentation d'une plate-forme d'expérimentation. Masters thesis, DEA Informatique d'Évry, 1998.
- [MT3] Emmanuel Delsinne. Structures de données indexées par un groupe, isomorphismes de gbf abéliens et extensions aux structures automatiques. Masters thesis, E.N.S. Cachan et Université de Rennes-I, 2002.
- [MT4] Valérie Larue. Structures de données indexées par un groupe : représentation graphique et extension au cas non abélien. Masters thesis, DEA Informatique d'Évry, 2002.

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- [MT7] Julien Cohen. *Intégration des collections topologiques et des transformations dans un langage fonctionnel*. Ph.D. thesis, Université d'Évry, 2004.
- [MT8] Nicolas Mann. Hyperstructures et modélisation de chimie artificielle dans le langage MGS. Masters thesis, DEA AMIB Université d'Évry, 2004.
- [MT9] Damien Boussié. Simulation en MGS du déplacement du spermatozoïde du nématode *Ascaris Suum*. Masters thesis, DEA AMIB Université d'Évry, 2004.
- [MT10] Lionel Perret. Intégration des types de données algébriques dans MGS. Masters thesis, École Centrale Paris, 2005.
- [MT11] Yann Jullian. Conception et développement d'un éditeur graphique de filtre pour MGS. Masters thesis, IIE, 2005.
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- [MT13] Antoine Spicher. *Transformation de collections topologiques de dimension arbitraires. Application à la modélisation de systèmes dynamiques*. Ph.D. thesis, Université d'Évry, 2006.
- [MT14] Christoph Kaleta. Outils de visualisation pour la simulation de systèmes dynamiques à structure dynamique. Masters thesis, Master Informatique, Universität Jena & Université d'Évry, 2007.