CURRICULUM-VITAE

Olivier Bournez

NOT UP-TO-DATE

1 Coordinates

Name:	**Bournez**
First Name:	**Olivier**
Birth Date:	May 25th 1973, in Besançon (25, Doubs, France)
Marital Status:	Married, 3 children • Pierrick born in 2001 • Laetitia born in 2003 • Ilan born in 2007
Position:	Full Professor of Ecole Polytechnique.
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2 Education

September 2008: Professor (Computer Science) at Ecole Polytechnique.

December 7th 2006:
Habilitation (*Habilitation à Diriger les Recherches*). Title: "Continuous Models. Computations. Distributed Algorithms". Institut National Polytechnique de Lorraine.

From October 1st 1999 to August 31 2008:
Researcher (*Chargé de Recherche*) at INRIA-Lorraine (First class since January 1st 2002).

January 18th 1999: Doctor in Computer Science of Ecole Normale Supérieure of Lyon. Title: "Algorithmic complexity of continuous and hybrid dynamical systems".

From November 1st 1997 to August 31th 1998:
National service as a researcher (*Scientifique du Contingent*) at VERIMAG Laboratory in Grenoble.

July 1996: Agrégation of Mathematics.

From September 1st 1995 to January 17th 1999:
PhD thesis at computer science laboratory "Laboratoire de l'Informatique du Parallélisme (LIP)" from Ecole Normale Supérieure of Lyon (Allocataire Moniteur Normalien after September 1st 1996).

June 1995: Master of Computer Science (*Magistère Informatique et Modélisation*) from Ecole Normale Supérieure de Lyon.
Rank: 1st.

June 1993: Licence of Mathematics

From September 15th 1992 to August 31th 1996:
Student from Ecole Normale Supérieure de Lyon.

3 Habilitation (*Habilitation à Diriger les Recherche*)

Title: Continuous Models. Computations. Distributed Algorithms.

Defense: December 7th 2006.

Referees: Eugène Asarin, S. Barry Cooper and Giuseppe Longo.

Examination Board:
Eugène Asarin, Vincent Blondel, S. Barry Cooper, José-Félix Costa, Claude Kirchner, Giuseppe Longo, Jean-Yves Marion

Summary:

Continuous dynamical systems make it possible to model many systems from physics, biology, or coming from distributed computational systems. We focus on their modeling power, and on their properties as computational models, and more generally on computational properties of continuous models.

First two chapters do not aim at producing new results, but aim at motivating this work and putting it into perspectives. Chapter 3 is a survey of theories of computations for continuous time sytems. Chapter 4 and 5, and Appendix A present an overview of some of our own results in relations with this problematic: in Chapter 4, we present several results about characterizations of computable functions over the integers in the classical sense and over the reals in the sense of recursive analysis in terms of classes of $\mathbb{R}$-recursive functions, and about the proof of the equivalence of computability in the General Purpose Analog Computer from Shannon and computability in recursive analysis. In Chapter 5, we present some machine independent characterizations à la Bellantoni and Cook 92 of all major complexity classes in the Blum Shub Smale, extended by Poizat, model of computation, on arbitrary logical structures. In Appendix A, we present a point of view on hypercomputations by discussing some variants of Church thesis, and by characterizing the computational power of several mathematical models.

4 PhD Thesis

Title: Algorithmic complexity of continuous and hybrid dynamical systems.

Defense: January 18th 1999.

Referees: Eugène Asarin and Max Dauchet.

Examination Board:

Eugène Asarin, Vincent Blondel, Michel Cosnard, Max Dauchet, Pascal Koiran and Oded Maler.

Summary:

This thesis presents a study of the algorithmic complexity of the automatic verification of properties of continuous and hybrid dynamical systems. We prove that stability is undecidable for saturated linear systems. We study the decidability of the mortality problem for two-by-two matrices. We study the representation of orthogonal and timed polyhedra by their vertices. Finally, we characterize the computational power of dynamical systems defined by a piecewise constant differential equation.

5 Awards

2007: Stanislas academy 2007 scientific award.

2000: LORIA laboratory award.

1999: PhD thesis national award from french chapter (*Association Française d'Informatique Théorique (AFIT)*) of European Association of Theoretical Computer Science (EATCS).

1999: PhD thesis national award (*Accessit du prix de thèse*) from *Société des Personnels Enseignants et Chercheurs in Informatique de France (SPECIF)*.

6 Responsabilities

Director of Laboratory:

From march 2010 to december 2015: Director of the LIX laboratory (Computer Science Laboratory) of Ecole Polytechnique.

Editorial Boards:

Since 2011: Member of the editorial board of the journal "Computability". Managing Editor since January 2016.

International Networks:

Since 2008: Elected member of the board of 'Computability in Europe network'. Managing the database and letter of the association.
See *http://www.maths.leeds.ac.uk/~pmt6sbc/cie.html.*

Since 2004: Coordinator of french node of network "Computability in Europe".
See *http://www.maths.leeds.ac.uk/~pmt6sbc/cie.html.*

2005-2006: National coordinator of a bi-national program (PAI PESSOA) with Manuel Campagnolo, IST, Lisbonne (Portugal).

National projects:

From Dec. 2005 To June 2009: Scientific coordinator of national project ANR ARA (Action de Recherche Amont) SOGEA "Security of Games. Equilibria and Distributed Algorithms".
See *http://sogea.loria.fr.*

Since June 2007: Coordinator of project SSS TATA "Théorie des jeux. Applications à l'Algorithmique".
Voir *http://tata.loria.fr.*

Research Group Direction:

Since 2007, Its creation until Sept. 2008: Vice head of research team CARTE from INRIA and LORIA.
http://carte.loria.fr

Pedagogical Responsabilities:

From Jan 2010 to December 2015: Vice-president of Computer Science Department of Ecole Polytechnique.

Recruitment Comittees:

In 2015: Member of the selection committee for a Maitre de Conference Position section 27 From Creteil Paris 12 University.

En 2014: Member of the selection committee for a Maitre de Conference Position section 27 From Paris 11 University and for a Maitre de Conference Position at Creteil Paris 12 University.

In 2013: Member of the selection committee for 2 Maitre de Conference Positions section 27 of Paris 12 University. Member of the selection committe for a professor position at Avignon University.

In 2012: Member of the selection committee for 2 Maitre de Conference Positions section 27 of Paris 12 University. Member of the selection committe for a professor position at Paris 7 University. Member of the selection committe for a Maitre de Conference position at Orléans University.

In 2011: Member of the admission committee for INRIA (Jury d'admission concours CR). Member of the selection committe for a professor position at Paris 12 University.

In 2009: Member of comités de sélection et d'auditions 27 PR 459 (Professor) et 27 MdC 454 (Assistant Professor = Maître de Conférence) of Orléans university.

Since 2004: Elected member of Commission de Spécialistes de l'Institut National Polytechnique de Lorraine (Ecole des Mines) 27ième section. Suppléant de 2004 à 2007. Titulaire depuis 2007.

- Member of the commission d'audition pour les recrutements de maîtres de conférences en 2006.

Since 2004: Nominated member of Commission de Spécialistes de l'Université de Metz 27ième section. Suppléant de 2004 à 2006. Titulaire depuis Novembre 2006.

- Member of commission mixte d'audition pour les recrutements de maîtres de conférences en 2006 à l'IUT de Metz.

Since 2001: Nominated member of Commission de Spécialistes de l'Université Henri Poincaré Nancy I 27ième section. Membre Titulaire de 2001 à 2004. Suppléant depuis 2004.

- Member of the commission d'audition pour les recrutements de maîtres de conférences en 2005.

Program committees:

- Member of the Steering committee of *"Reachability Problems"*.

- Member of the Program Committee of conference *"Unconventional Computations (and Natural Computations) 2009, 2010, 2011, 2015"*.
- Member of the Program Committee of conference *"Computability in Europe 2006, 2009, 2014"*.
- Member of the Program Committee of conference *"Reachability Problems 2007, 2008, 2009, 2010', 2011'*.
- Member of the Program Committee of conference *"Physics and Computation 2009, 2010 and 2011"*.
- Member of the Program Committee of conference *"Numerical Computations: Theory and Algorithms NUMTA2013"*.
- Member of the Program Committee of conference *"Development of Computational Models 2010"*.
- Member of the Scientific Committee of conference *"Inaugural International Embedded and Hybrid Systems Conference (IEHSC'05)"*.

Organisation of events:

In 2009: Chair and organization of the LIX Fall Colloquium, edition 2009. Hosting "Reachability Problems'09". *http://www.lix.polytechnique.fr/rp09/.*

In 2009: Co-organization (with Gilles Dowek) of workshop "Physics and Computations" PC'2009. *http://www.lix.polytechnique.fr/ bournez/PC2009/.*

In 2007: Scientific coordinator in 2007 of Ecole Jeunes Checheurs en Informatique Mathématique (ex. Ecole Jeunes Chercheurs en Algorithmique et Calcul Formel), 18 to 24 March 2007, LORIA, Nancy. Co-organization with Pierrick Gaudry, and INRIA Lorraine's service des colloques. *http://ejcim2007.loria.fr.*

In 2007: Co-organization (with Didier Galmiche) of *Complexité Modèles Finis et Bases de Données*, 21 to 22 May 2007, LORIA, Nancy. *http://cmfbd2007.loria.fr*

In 2007: Co-organization (with Paola Bonizzoni) of a session *"Logic and New Computational Paradigms"*, of conference CIE 2007, 18 to 23 June 2007, Sienna, Italy.

In 2007: Organization of session *"Modèles de Calculs sur les Réels"* of workshop "Arithmétiques du GDR Informatique Mathématique", 24 January 2007, Montpellier.

In 2006: Co-organization (with Michel de Rougemont) of scientific day in Paris II, 12 Place du Panthéon, Paris, on 16 May 2006 on *"Théorie algorithmique des Jeux. Applications aux Réseaux de Télécommunications et de Capteurs"*.

In 2005: Co-organization (with Manuel Campagnolo) of a workshop workshop in Lisbon from 27 to 28 June 2005 about *"Computations on the continuum.*

In 2005: Co-organization (with Paulin de Naurois and Jean-Yves Marion) of a scientific QSL day about *"Et les autres modèles de calcul?"*. 24 March 2005.

In 2002:
- Organization of several days of talks *"matinées de la plateforme"* in LORIA.
- Co-organization of a scientific day on *"les outils logiciels pour la vérification"* in LORIA.

Board of directors:

Since 2006: Member of the board of directors of Association Française d'Informatique Fondamentale (AFIF), french chapter of l'EATCS (European Association for Theoretical Computer Science).

De 2006 à 2008: Elected member (SGEN-CFDT) suppléant of Board of directors of l'INRIA.

National PhD Thesis Award Committees:

Since 2004: Member of jury de thèses de l'Association Française d'Informatique Théorique (AFIT), now Association Française d'Informatique Fondamentale (AFIF).

7 Supervising activities

PhD Theses (defended):

- **PhD Thesis of Amaury Pouly**:
  Continuous models of computation: from computability to complexity.
  Defended on 6 July 2015. Amaury is currently PostDoc in Oxford.
- **PhD Thesis of Mikaël Rabie**:
  The Power of Weaknesses, what can be computed with Populations, Protocols and Machines.
  Defended on 31 August 2015. Mikaël is currently on a ATER position at Paris Dauphine University.
- **PhD Thesis of Jonas Lefèvre**:
  Réseaux d'interactions d'agents anoynmes.
  Defended on 9 December 2014. Jonas is currently PostDoc in Paderborn.
- **PhD Thesis of Xavier Koegler**:
  Population protocols, games, and large populations..
  Defended on 13 September 2012. Co-supervised with Pierre Fraignaud, Paris-VII. Xavier is currently "Computer Scientist" at "Smart AdServer".

- **PhD Thesis of Emmanuel Hainry**:
  Continuous Computational Models. Comparison Results.
  Defended on December 7th 2006 (started in september 2003). Emmanuel is currently assistant professor in Nancy.
- **PhD Thesis of Florent Garnier**:
  Termination of probabilistic rewrite rules in finite expected time.
  Defended in September 17th 2007 (started in September 2003). Co-supervised with Claude Kirchner.
- **PhD Thesis of Paulin de Naurois**:
  Completeness Results and Syntactic Characterizations of Complexity Classes over Arbitrary Structures.
  Defended on December 15th 2004. Co-directed with F. Cucker, City University, Hong Kong (*Cotutelle de thèse*) and J.Y. Marion (started in october 2001). Paulin is currently a CNRS full-time researcher since 2006.
- **PhD Thesis of Mariana-Liliana Ibanescu**:
  Rule-Based Programming and Strategies for Automated Generation of Detailed Kinetic Models for Gas Phase Combustion of Polycyclic Hydrocarbon Molecules.
  Defended on June 14th 2004. Co-supervised with Hélène Kirchner, in collaboration with the *Département Chimie Physique des Réactions (DCPR)* from *Ecole Nationale Supérieure des Industries Chimiques (ENSIC)* (started in January 2001).
  PhD Thesis award from *Institut National Polytechnique de Lorraine.* Liliana is currently assistant professor at Agronomic National Institute (*Institut National Agronomique*) in Paris-Grignon.

Masters:

- **Master thesis of Xavier Koegler**:
  Continuous Population Protocols.
  M2 MPRI, Student from ENS Paris.
- **Master thesis of Emmanuel Hainry**:
  Computable real functions and $\mathbb{R}$-recursive functions.
  Master from ENS Lyon, from february 2003 to july 2003.
- **Master thesis of Djalel Abdemouche**:
  Hybrid systems, rewriting calculus, and probabilistic rules.
  Co-supervised with Claude Kirchner. Master from Nancy I University, from february 2001 to september 2001.

Engineers:

- **Work from Mohamed El-Habib**:
  Developpment of the QSL platform.
  Plateform for the experimentation and technological transfer,

action from axis "Quality and Safety of Software" from *Contrat de Plan Etat Région Lorraine* (from October 2001 to september 2002).

- **Work from Hassen Kacem**:
  Implementation of verification algorithms for timed automata in ELAN system.
  Co-supervised with C. Kirchner (from september 2000 to september 2001).

Engineer Training Periods:

- **Pierre Henninger (ESIAL 2nd year)**:
  Developpment of an input/output interface for GasEl system. (july/august 2003).
- **Régis Durand (ESIAL 2nd year)**: Canonicity algorithms for the representation of polycyclic molecules. (july/august 2003).

ENS Training Periods:

- **Guillaume Aupy (ENS Lyon 1st year)**: Infinite Population Protocols. (6 weeks in 2009).
- **Michael Rabbie (ENS Lyon 1st year)**: Population Protocols & Games. (6 weeks in 2009).
- **Xavier Koegler (ENS Paris 1st year)**: Continuous population protocols. Co-supervised with Johanne Cohen (2 months in 2006).
- **André Chailloux (ENS Lyon 1st year)**: Mechanisms from game theory and algorithmic. Co-supervised with Johanne Cohen (6 weeks in 2005).
- **Damien Regnault (ENS Lyon 1st year)**: Logic on graphs and broadcast protocols. Co-supervised with Johanne Cohen (6 weeks in 2003).
- **Guillaume Burel (ENS Lyon 1st year)**: Equational logic and probabilities following Halpern. Co-supervised with Claude Kirchner (6 weeks in 2003).
- **Mathieu Hoyrup (ENS Lyon 1st year)**: Rewriting calculus with probabilistic choices. Co-supervised with Claude Kirchner (6 weeks in 2002).
- **Emmanuel Beffara (ENS Lyon 1st year)**: Timed automata and rewriting calculus. Co-supervised with Claude Kirchner (6 weeks in 2000).

8 Publications

8.1 Edited proceedings or chapter of books

[1] Olivier Bournez. *Informatique Mathématique Une photographie en 2022. Cours donnés à l'Ecole Jeunes Chercheurs en Informatique Mathématiques.*, chapter Le Calcul Analogique.

[2] Olivier Bournez, Enrico Formenti, and Igor Potapov, editors. *Reachability Problems - 17th International Conference, RP 2023, Nice, France, October 11-13, 2023, Proceedings*, volume 14235 of *Lecture Notes in Computer Science*. Springer, 2023.

[3] Olivier Bournez, Gilles Dowek, Rémi Gilleron, Serge Grigorieff, Jean-Yves Marion, Simon Perdrix, and Sophie Tison. *L'I.A. frontières et Applications*, volume 3 of *Panorama de l'Intelligence Artificielle*, chapter Informatique théorique : complexité, automates et au-delà. Cépaduès Editions, http://www.cepadues.com/, 2014.

[4] Olivier Bournez, Gilles Dowek, Rémi Gilleron, Serge Grigorieff, Jean-Yves Marion, Simon Perdrix, and Sophie Tison. *L'I.A. frontières et Applications*, volume 3 of *Panorama de l'Intelligence Artificielle*, chapter Informatique théorique : calculabilité, décidabilité et logique. Cépaduès Editions, http://www.cepadues.com/, 2014.

[5] *Reachability Problems (RP 2009) Special Issue*, volume 22 of *International Journal of Foundations of Computer Science*, 2011.

[6] Olivier Bournez and Igor Potapov, editors. *Reachability Problems, 3rd International Workshop, RP 2009, Palaiseau, France, September 23-25, 2009. Proceedings*, volume 5797 of *Lecture Notes in Computer Science*. Springer, 2009.

[7] Olivier Bournez and Manuel L. Campagnolo. *New Computational Paradigms. Changing Conceptions of What is Computable*, chapter A Survey on Continuous Time Computations, pages 383–423. Springer-Verlag, New York, 2008.

[8] Olivier Bournez and Michael B. Branicky. *Open Problems in Mathematical Systems and Control Theory*, chapter On matrix mortality in low dimensions, pages 67–70. Springer-Verlag, London, 1998.

8.2 Journals

[1] Manon Blanc and Olivier Bournez. Simulation of turing machines with analytic discrete ODEs: FPTIME and FPSPACE over the reals characterised with discrete ordinary differential equations. *arXiv preprint arXiv:2307.11747*, 2023.

[2] Olivier Bournez and Arnaud Durand. A characterization of functions over the integers computable in polynomial time using discrete ordinary differential equations. *Computational Complexity*, 32(2):7, 2023.

[3] Olivier Bournez, Riccardo Gozzi, Daniel S Graça, and Amaury Pouly. A continuous characterization of PSPACE using polynomial ordinary differential equations. *Journal of Complexity*, 77:101755, august 2023.

[4] Olivier Bournez and Amaury Pouly. A universal ordinary differential equation. *Logical Methods in Computer Science*, 16(1), 2020.

[5] Olivier Bournez. La revanche du calcul analogique. *Blog 'Binaire' du journal 'Le Monde'*, 15 Février 2019. 2019.

[6] Olivier Bournez and Sabrina Ouazzani. Continuous ordinary differential equations and transfinite computations. *ArXiv e-prints*, 2019.

[7] Oliver Bournez, Oleksiy Kurganskyy, and Igor Potapov. Reachability problems for one-dimensional piecewise affine maps. *International Journal of Foundations of Computer Science*, 2018.

[8] Olivier Bournez, Daniel S. Graça, and Amaury Pouly. Polynomial Time corresponds to Solutions of Polynomial Ordinary Differential Equations of Polynomial Length. *Journal of the ACM*, 64(6):38:1–38:76, 2017.

[9] O. Bournez, J. Cohen, and M. Rabie. Homonym Population Protocols. *Theory of Computing Systems*, 62(5):1318–1346, 2017.

[10] Olivier Bournez, Daniel Graça, and Amaury Pouly. On the Functions Generated by the General Purpose Analog Computer. *Information and Computation*, 257:34–57, 2017.

[11] H. Bazille, O. Bournez, W. Gomaa, and A. Pouly. On The Complexity of Bounded Time Reachability for Piecewise Affine Systems. *Theoretical Computer Science*, 735:132–146, 2016.

[12] Olivier Bournez, Daniel Graça, and Amaury Pouly. Computing with polynomial ordinary differential equations. *Journal of Complexity*, 36:106 – 140, 2016.

[13] Olivier Bournez, Daniel S. Graça, and Emmanuel Hainry. Computation with perturbed dynamical systems. *Journal of Computer System Science*, 79(5):714–724, 2013.

[14] Olivier Bournez, Jérémie Chalopin, Johanne Cohen, Xavier Koegler, and Rabie Mikaël. Population protocols that correspond to symmetric games. *International Journal of Unconventional Computation*, 9(1–2):5–36, 2013.

[15] Olivier Bournez and Gilles Dowek. Physics and computation special issue. *Natural Computing*, 11(1):1, 2012.

[16] Olivier Bournez, Walid Gomaa, and Emmanuel Hainry. Algebraic characterizations of complexity-theoretic classes of real functions. *IJUC*, 7(5):331–351, 2011.

[17] Guillaume Aupy and Olivier Bournez. On the number of binary-minded individuals required to compute $\sqrt{\frac{1}{2}}$. *Theoretical Computer Science*, 411(22):2262–2267, 2011.

[18] Dominique Barth, Olivier Bournez, Octave Boussaton, and Johanne Cohen. Distributed learning of equilibria in a routing game. *Parallel Processing Letters*, 19:189–204, 2009.

[19] Olivier Bournez, Philippe Chassaing, Johanne Cohen, Lucas Gerin, and Xavier Koegler. On the convergence of population protocols when population goes to infinity. *Applied Mathematics and Computation*, 215(4):1340–1350, 2009.

[20] Olivier Bournez, Manuel L. Campagnolo, Daniel Graça, and Emmanuel S. Hainry. Polynomial differential equations compute all real computable functions on computable compact intervals. *Journal of Complexity*, 23(3):317–335, 2007.

[21] Olivier Bournez, Manuel L. Campagnolo, Daniel S. Graça, and Emmanuel Hainry. Polynomial differential equations compute all real computable functions on computable compact intervals. *Journal of Complexity*, 23(3):317–335, June 2007.

[22] Olivier Bournez, Felipe Cucker, Paulin Jacobé de Naurois, and Jean-Yves Marion. Implicit complexity over an arbitrary structure: Quantifier alternations. *Information and Computation*, 202(2):210–230, February 2006.

[23] Olivier Bournez and Emmanuel Hainry. Recursive analysis characterized as a class of real recursive functions. *Fundamenta Informaticae*, 74(4):409–433, December 2006.

[24] Olivier Bournez. How much can analog and hybrid systems be proved (super-)Turing. *Applied Mathematics and Computation*, 178(1):58–71, 2006.

[25] Olivier Bournez and Emmanuel Hainry. Elementarily computable functions over the real numbers and $\mathbb{R}$-sub-recursive functions. *Theoretical Computer Science*, 348(2–3):130–147, 2005.

[26] Olivier Bournez, Felipe Cucker, Paulin Jacobé de Naurois, and Jean-Yves Marion. Implicit complexity over an arbitrary structure: Sequential and parallel polynomial time. *Journal of Logic and Computation*, 15(1):41–58, 2005.

[27] Olivier Bournez and Michael Branicky. The mortality problem for matrices of low dimensions. *Theory of Computing Systems*, 35(4):433–448, Jul-Aug 2002.

[28] Vincent D. Blondel, Olivier Bournez, Pascal Koiran, and John Tsitsiklis. The stability of saturated linear dynamical systems is undecidable. *Journal of Computer and System Science*, 62(3):442–462, May 2001.

[29] Vincent Blondel, Olivier Bournez, Pascal Koiran, Christos Papadimitriou, and John Tsitsiklis. Deciding stability and mortality of piecewise affine dynamical systems. *Theoretical Computer Science A*, 1–2(255):687–696, 2001.

[30] Eugene Asarin, Olivier Bournez, Thao Dang, Oded Maler, and Amir Pnueli. Effective synthesis of switching controllers for linear systems. *Proceedings of the IEEE, Special Issue on 'Hybrid Systems"*, 88(7):1011–1025, July 2000.

[31] Olivier Bournez. Some bounds on the computational power of piecewise constant derivative systems. *Theory of Computing Systems*, 32(1):35–67, 1999.

[32] Olivier Bournez. Achilles and the Tortoise climbing up the hyperarithmetical hierarchy. *Theoretical Computer Science*, 210(1):21–71, 6 January 1999.

[33] Patrick Gros, Olivier Bournez, and Edmond Boyer. Using local planar geometric invariants to match and model images of line segments. *Computer Vision and Image Understanding: CVIU*, 69(2):135–155, February 1998.

[34] Olivier Bournez and Michel Cosnard. On the computational power of dynamical systems and hybrid systems. *Theoretical Computer Science*, 168(2):417–459, November 1996.

8.3 Conferences

[1] Manon Blanc and Olivier Bournez. Quantifiying the Robustness of Dynamical Systems. Relating Time and Space to Length and Precision. In Aniello Murano and Alexandra Silva, editors, *32nd EACSL Annual Conference on Computer Science Logic (CSL 2024)*, volume 288 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 17:1–17:20, Dagstuhl, Germany, 2024. Schloss Dagstuhl – Leibniz-Zentrum für Informatik.

[2] Olivier Bournez and Riccardo Gozzi. Solving discontinuous initial value problems with unique solutions is equivalent to computing over the transfinite. In *Symposium on Theoretical Aspects of Computer Science (STACS), Clermont-Ferrand, France*, 2024.

[3] Manon Blanc and Olivier Bournez. A characterisation of functions computable in polynomial time and space over the reals with discrete ordinary differential equations: Simulation of turing machines with analytic discrete odes (MFCS'2023 best paper award). In *48th International Symposium on Mathematical Foundations of Computer Science (MFCS 2023)*, volume 272. Schloss Dagstuhl-Leibniz-Zentrum für Informatik, 2023.

[4] Manon Blanc and Olivier Bournez. Measuring the robustness of the dynamical systems. relating time and space to length and precision. In *7th International Workshop "Women in Logic" Wil'2023*, Rome, Italy, July 2023.

[5] Manon Blanc and Olivier Bournez. Characterisations of polynomial-time and -space complexity classes over the reals characterisations of polynomial-time and -space complexity classes over the reals. In *Twentieth International Conference on Computability and Complexity in Analysis CCA'23*, Dubronik, Croatia, September 2023.

[6] Olivier Bournez and Riccardo Gozzi. Discontinuous ivps with unique solutions. In *Twentieth International Conference on Computability and Complexity in Analysis CCA'23*, Dubronik, Croatia, September 2023.

[7] Olivier Bournez, Johanne Cohen, and Valentin Dardilhac. On the δ-decidability of decision problems for neural network questions. In *Twentieth International Conference on Computability and Complexity in Analysis CCA'23*, Dubronik, Croatia, September 2023.

[8] Olivier Bournez and Riccardo Gozzi. Discontinuous ivps with unique solutions. In *Continuity, Computability, Constructivity. From Logic to Algorithms. CCC'23*, Kyoto, Japan, September 2023.

[9] Manon Blanc and Olivier Bournez. Characterisations of polynomial-time and -space complexity classes over the reals characterisations of polynomial-time and -space complexity classes over the reals. In *Continuity, Computability, Constructivity. From Logic to Algorithms. CCC'23*, Kyoto, Japan, September 2023.

[10] Olivier Bournez, Johanne Cohen, and Valentin Dardilhac. On the δ-decidability of decision problems for neural network questions. In *Computability, Continuity, Constructivity - from Logic to Algorithms CCC'23*, 2023.

[11] Manon Blanc and Olivier Bournez. A characterization of polynomial time computable functions from the integers to the reals using discrete ordinary differential equations (best student paper award mcu 2022). In Jérôme Durand-Lose and György Vaszil, editors, *Machines, Computations, and Universality - 9th International Conference, MCU 2022, Debrecen, Hungary, August 31 - September 2, 2022, Proceedings*, volume 13419 of *Lecture Notes in Computer Science*, pages 58–74. Springer, 2022.

[12] Olivier Bournez. Programming with ordinary differential equations: Some first steps towards a programming language. In Ulrich Berger, Johanna N. Y. Franklin, Florin Manea, and Arno Pauly, editors, *Revolutions and Revelations in Computability - 18th Conference on Computability in Europe, CiE 2022, Swansea, UK, July 11-15, 2022, Proceedings*, volume 13359 of *Lecture Notes in Computer Science*, pages 39–51. Springer, 2022.

[13] Olivier Bournez. Computability, complexity and programming with ordinary differential equations (invited talk). In *37th International Symposium on Theoretical Aspects of Computer Science (STACS 2020)*. Schloss Dagstuhl-Leibniz-Zentrum für Informatik, 2020.

[14] Olivier Bournez and Arnaud Durand. Recursion schemes, discrete differential equations and characterization of polynomial time computation. In Peter Rossmanith, Pinar Heggernes, and Joost-Pieter Katoen, editors, *44th Int Symposium on Mathematical Foundations of Computer Science, MFCS*, volume 138 of *LIPIcs*, pages 23:1–23:14. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2019.

[15] Olivier Bournez. Ordinary differential equations & computability. In *20th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC'2018)*, 2018.

[16] Olivier Bournez and Sabrina Ouazzani. Cheap non-standard analysis and computability: Some applications. In *20th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC'2018)*, 2018.

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8.4 Habilitation et Thèse

[1] Olivier Bournez. *Modèles Continus. Calculs. Algorithmique Distribuée.* Hdr, Institut National Polytechnique de Lorraine, 7 Décembre 2006.

[2] Olivier Bournez. *Complexité Algorithmique des Systèmes Dynamiques Continus et Hybrides.* Phd thesis, Ecole Normale Supérieure de Lyon, 18 Janvier 1999.

9 Software Developpments

QSL Plateform:
Supervision and active participation from october 2001 to october 2002 to the developpement with engineer Mohamed El Habib of a software plateform aiming at offering an easy access to software tools about quality and safety of software. Work within the framework of the "quality and safety of software" axis of *Contrat de Plan Etat Région. http://plateforme-qsl.loria.fr.*

GasEl System:
Co-supervision of the PhD Thesis of Liliana Ibanescu, that aimed at building a software system *GasEl* based on ELAN system for the automatic generation of kinetic mechanisms for gas phase combustion of polycyclic hydrocarbon molecules in diesel engines.

Prototype for the verification of timed and hybrid automata:
Supervision and active participation to the developpment with engineer Hassen Kacem of prototypes to use ELAN system to do automatic verification of timed and hybrid systems.
http://www.loria.fr/~bournez/logiciels.html.

Cube System:

Developpment of system Cube, that provides a library to test and use the representations of polyhedra proposed in paper [64]. Library used by software d/dt from VERIMAG in Grenoble (www-verimag.imag.fr/~tdang/ddt.html). The library was also used by some PhD students in Lausanne, Switzerland.
http://www.loria.fr/~bournez/logiciels.html.

10 Teaching

Courses:

Cours at Ecole Polytechnique, *"INF412, Foundations of Computer Science*: 2nd year of Ecole Polytechnique.
http://www.enseignement.polytechnique.fr/informatique/INF423/

Cours at Ecole Polytechnique, *"INF561, Algorithms and Complexity*: 3rd year of Ecole Polytechnique.
http://www.enseignement.polytechnique.fr/informatique/INF561/

Cours at Ecole Polytechnique, *"INF421b, Bases of Programmation*: and of algorithmic". 2nd year of Ecole Polytechnique.
http://www.enseignement.polytechnique.fr/informatique/INF421/

Master (2nd year) Course, on "*Model-checking*": Master of Nancy I University. Total: 84H on period september 2000-september 2007. (12h in 2000, 10h in 2001, 10h in 2002, 10h en 2003, 12h in 2004, 16h in 2005, 14h in 2006).
Slides (in french): *www.loria.fr/~bournez/enseignements.html* .

Master (2nd year) Course, on "*Semantic of distributed and parallel systems*": Master of Nancy I University. Total: 6h on period september 2005-september 2006.
Slides (in french): *www.loria.fr/~bournez/enseignements.html* .

Master (2nd year) Course, on "*Complexity*": Master of Nancy I University. Total: 30H on period september 2002-september 2005. (10h in 2002, 10h in 2003, 10h in 2004).
Slides (in french): *www.loria.fr/~bournez/enseignements.html* .

Master (1st year) Course, on "*Algorithms and Complexity*": Master of Nancy I University. Total: 75H on period september 2004-september 2007. (30H in 2004, 30H in 2005, 15H in 2006).
Slides (in french): *www.loria.fr/~bournez/enseignements.html* .

Tutorial Classes:

Algorithms and Complexity: Master (1st year) from Nancy I University. Total: 15h on period september 2005-september 2006.

Initiation to Research: Ecole des Mines de Nancy. Total: 8H in 2005.

Algorithms for Distributed and Parallel Systems: Engineer School ESIAL 2nd year. Total: 48H on period january 2002-september 2004. (24h in 2003, 24h in 2004)

C Language: University Lyon I, Deug MIASS 2nd year. Volume Total: 24h on period september 1997-september 1998.

Image Analysis and Synthesis: Master from ENS Lyon 1st year. Total: 32H on period september 1997-september 1998.

Pascal language: Université Lyon I, Deug STPI 1ière année. Total: 14H on period september 1995-september 1996.

λ***-calculus***: Master from ENS Lyon 1st year. Total: 32H on period september 1995-september 1996.

Computability: Master from ENS Lyon 1st year. Total: 32H on period september 1995-september 1996.