

# Curriculum Vitæ

## Vincent Acary

Born on 15th May 1973, Laval (Mayenne), France. French Citizen. Married, two children.

### Current position & address

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Permanent INRIA Researcher (CR1) at INRIA (French national research institute for computer sciences and control).

INRIA Chile,

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and

Centre de recherche Grenoble Rhône-Alpes, Equipe-projet BIPOP

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<http://bipop.inrialpes.fr/people/acary>

### Education

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- 2015      **Habilitation à diriger les recherches (HdR)**. Applied Mathematics.  
Doctoral school of Mathematics, Information Sciences and Technologies, and Computer Science. Grenoble University.
- 1997 – 2000      **PhD Thesis**. Mechanics.  
Ecole Supérieure de Mécanique de Marseille (ESM2) & Université d'Aix-Marseille II
- 1997      **Master in Science in Mechanics (D.E.A.)**  
ESM2 & Université d'Aix-Marseille II. Mention Bien (Rank 1<sup>er</sup>/30).
- 1994 – 1997      **Engineering Diploma of ESM2**, (nowadays École Centrale Marseille)

### Work Experience

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- 2016-      **Permanent researcher** INRIA Rhône-Alpes
- 2014–2016      **Permanent researcher** INRIA Chile, Santiago de Chile
- 2003–2013      **Permanent researcher** INRIA Rhône-Alpes
- 2003      **Post-doctoral fellow** INRIA Rhône-Alpes. European project SICONOS.
- 2001 – 2002      **Post-doctoral fellow** Post-doctoral CNRS grant.  
Laboratoire d'Automatique de Grenoble (LAG UMR CNRS/UJF/INPG 5528)/Schneider Electric.
- 1997 – 2000      **PhD candidate**. BDI CNRS grant.  
Laboratoire de Mécanique et d'Acoustique (LMA, UPR CNRS 7051, Marseille) & Groupe pour l'Application des Méthodes Scientifiques à l'Architecture et l'Urbanisme (GAMSAU, UMR CNRS 694, Marseille).

### Scientific repsonsabilities

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2011– ENNSD. Co-founder and animator of the European network for nonsmooth dynamics  
<http://ennsd.gforge.inria.fr/>

2011–2015 CHASLIM. ANR (French National Agency for science) (Blanc) project.  
co-responsible for the work package 5 “Numerical tools and software development.”

2008–2012 SALADYN. ANR project COSINUS 2008.  
Principal investigator.

2007–2009 VAL-AMS. ANR project SETIN-2006.  
Responsible for the work package 3 “Advanced numerical analysis techniques.”

2003–2007 SICONOS. IST2001-37172. FP7 European Project.  
Responsible for the work package 2 “Numerical algorithms and software tools”.

# Research Activities

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## Main research themes

Modeling, analysis, simulation and control of nonsmooth dynamical systems :

- Time integration schemes for nonsmooth dynamical systems :  
Higher order sweeping process, complementarity systems and evolution variational inequalities, higher order time integration scheme for nonsmooth mechanics, time-discontinuous Galerkin methods.
- Modeling, analysis and simulation of unilateral contact, impacts and Coulomb friction :  
Multiple impact law modeling, formulation of problems with unilateral contact and Coulomb friction in second order cone complementarity problems, numerical optimization based methods.
- Modeling, analysis and simulation of switched electrical circuits. Modeling of ideal electrical components in complementarity form, automatic circuit equation formulation of switched electrical circuit, time integration methods and solving procedure, numerical computations of periodic solutions.
- Time discretization methods for sliding mode control.  
Formulation of sliding mode control in terms of complementarity, implicit time discretization strategies free of numerical chattering.
- Simulation methods of gene regulatory networks :  
discontinuous differential equations, differential inclusion, Filippov's solution, stability.

## Transfert & industrial applications

- Simulation and modeling of electrical power converters (STMicroelectronics and Mentor Graphics & patent on "improved circuit simulator)
- Simulation and design of electrical circuit breakers (more than 10 years of collaboration with Schneider Electric)
- Simulation and design of space robotic systems (ESA ExoMars project. Collaboration with TRASY/Space Belgium)
- Numerical design and simulation software of multi-body systems (collaboration with ANSYS, France.)

## Books

- [B1] V. Acary, O. Bonnefon, and B. Brogliato. *Nonsmooth modeling and simulation for switched circuits*. Lecture Notes in Electrical Engineering 69. Dordrecht : Springer. xxiii, 284 p., 2011.
- [B2] V. Acary and B. Brogliato. *Numerical methods for nonsmooth dynamical systems. Applications in mechanics and electronics*. Lecture Notes in Applied and Computational Mechanics 35. Berlin : Springer. xxi, 525 p. , 2008.

## Invited chapters in edited books.

- [CiB1] O. Huber, B. Brogliato, V. Acary, A. Boubakir, F. Plestan, and Wang B. Experimental results on implicit and explicit time-discretization of equivalent-control-based sliding-mode control. In L. Fridman, J.P. Barbot, and F. Plestan, editors, *Recent Trends in Sliding Mode Control*. IET, 2016.

- [CiB2] V. Acary and F. Cadoux. *Recent Advances in Contact Mechanics, Stavroulakis, Georgios E. (Ed.)*, volume 56 of *Lecture Notes in Applied and Computational Mechanics*, chapter Applications of an existence result for the Coulomb friction problem. Springer Verlag, 2013.
- [CiB3] V. Acary. *Dynamics and Control of Switched Electronic Systems Vasca, Francesco ; Iannelli, Luigi (Eds.)*, chapter 14. Time-Stepping via Complementarity, pages 417–450. *Advances in Industrial Control*. Springer Verlag, 2012. XIV, 492 p. 240 illus., 61 in color.
- [CiB4] V. Acary and B. Brogliato. *Nonsmooth Mechanics and Analysis. Theoretical and Numerical Advances. P. Alart, O. Maissenneuve, R. T. Rockafellar (Eds)*, volume 12 of *Advances in Mechanics and Mathematics*, chapter 22. Higher Order Moreau’s Sweeping Process, pages 261–276. Springer Verlag, 2006. ISBN : 978-0-387-29196-3 (Print) 978-0-387-29195-6 (Online).

## Published or in press journal articles

- [A1] N. Akhadkar, V. Acary, and B. Brogliato. Analysis of collocated feedback controllers for four-bar planar mechanisms with joint clearances. *Multibody Systems Dynamics*, 38 :101–138, June 2016.
- [A2] V. Sessa, L. Giannelli, F. Vasca, and V. Acary. A complementarity approach for the computation of periodic oscillations in piecewise linear systems. *Nonlinear Dynamics*, 2016. in press.
- [A3] V. Acary, B. Brogliato, and Y. Orlov. Comments on ”Chattering-free digital sliding-mode control with state observer and disturbance rejection”. *IEEE Transactions on Automatic Control*, 2016.
- [A4] O. Huber, V. Acary, and B. Brogliato. Lyapunov stability and performance analysis of the implicit discrete sliding mode control. *IEEE Transactions on Automatic Control*, 2016. In press.
- [A5] O. Huber, V. Acary, B. Brogliato, and F. Plestan. Implicit discrete-time twisting controller without numerical chattering : analysis and experimental results. *Control Engineering Practice*, 46 :129–141, 2016.
- [A6] V. Acary. Energy conservation and dissipation properties of time-integration methods for the nonsmooth elastodynamics with contact. *Zeitschrift für Angewandte Mathematik und Mechanik*, Article published online, 2015.
- [A7] B. Wang, B. Brogliato, V. Acary, A. Boubakir, and F. Plestan. Experimental comparisons between implicit and explicit implementations of discrete-time sliding mode controllers : towards input and output chattering suppression. *IEEE Transactions on Control Systems Technology*, 23(5) :2071–2075, 2015.
- [A8] T. Schindler, S. Rezaei, J. Kursawe, and V. Acary. Half-explicit timestepping schemes on velocity level based on time-discontinuous galerkin methods. *Computer methods in Applied Mechanics in Engineering*, 290(15) :250–276, 2015.
- [A9] O. Brüls, V. Acary, and A. Cardona. Simultaneous enforcement of constraints at position and velocity levels in the nonsmooth generalized- $\alpha$  scheme. *Computer Methods in Applied Mechanics and Engineering*, 281 :131–161, November 2014.
- [A10] V. Acary, H. de Jong, and B. Brogliato. Numerical simulation of piecewise-linear models of gene regulatory networks using complementarity systems theory. *Physica D*, 269 :103–199, January 2013.
- [A11] Q. Z. Chen, V. Acary, G. Virlez, and O. Brüls. A nonsmooth generalized- $\alpha$  scheme for flexible multibody systems with unilateral constraints. *International Journal for Numerical Methods in Engineering*, 96(8) :487–511, 2013.
- [A12] T. Schindler and V. Acary. Timestepping schemes for nonsmooth dynamics based on discontinuous galerkin methods : Definition and outlook. *Mathematics and Computers in Simulation*, 95 :180–199, 2013.
- [A13] S. Greenhalgh, V. Acary, and B. Brogliato. On preserving dissipativity properties of linear complementarity dynamical systems with the  $\theta$ -method. *Numerische Mathematik*, 125 :601–637, 2013.
- [A14] V. Acary. Projected event-capturing time-stepping schemes for nonsmooth mechanical systems with unilateral contact and Coulomb’s friction. *Computer Methods in Applied Mechanics and Engineering*, 256 :224 – 250, 2013.

- [A15] V. Acary. Higher order event capturing time–stepping schemes for nonsmooth multibody systems with unilateral constraints and impacts. *Applied Numerical Mathematics*, 62 :1259–1275, 2012.
- [A16] V. Acary, B. Brogliato, and Y.V. Orlov. Chattering-free digital sliding-mode control with state observer and disturbance rejection. *Automatic Control, IEEE Transactions on*, 57(5) :1087 –1101, may 2012.
- [A17] C. Georgescu, B. Brogliato, and V. Acary. Switching, relay and complementarity systems : A tutorial on their well-posedness and relationships. *Physica D : Nonlinear Phenomena*, 241(22) :1985 – 2002, 2012. Dynamics and Bifurcations of Nonsmooth Systems.
- [A18] F. Bertails-Descoubes, F. Cadoux, G. Daviet, and V. Acary. A Nonsmooth Newton Solver for Capturing Exact Coulomb Friction in Fiber Assemblies. *ACM Transactions on Graphics*, January 2011.
- [A19] V. Acary, F. Cadoux, C. Lemaréchal, and J. Malick. A formulation of the linear discrete coulomb friction problem via convex optimization. *ZAMM - Journal of Applied Mathematics and Mechanics / Zeitschrift für Angewandte Mathematik und Mechanik*, 91(2) :155–175, 2011.
- [A20] V. Acary and B. Brogliato. Implicit Euler numerical scheme and chattering-free implementation of sliding mode systems. *Systems and Control Letters.*, 2010. doi :10.1016/j.sysconle.2010.03.002.
- [A21] V. Acary, O. Bonnefon, and B. Brogliato. Time-stepping numerical simulation of switched circuits with the nonsmooth dynamical systems approach. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, 29(7) :1042 – 1055, 2010.
- [A22] V. Acary, B. Brogliato, and D. Goeleven. Higher order Moreau’s sweeping process : mathematical formulation and numerical simulation. *Mathematical Programming Ser. A*, 113 :133–217, 2008.
- [A23] V. Acary and F. Périignon. Siconos : A Software Platform for Modeling, Simulation, Analysis and Control of Nonsmooth Dynamical Systems. *Simulation News in Europe*, 17(3/4) :19–26, December 2007.
- [A24] B. Brogliato, A. Daniilidis, C. Lemaréchal, and V. Acary. On the equivalence between complementarity systems, projected systems and differential inclusions. *Systems and Control Letters*, 55 :45–51, 2006.
- [A25] Y. Monerie and V. Acary. Formulation dynamique d’un modèle de zone cohésive tridimensionnel couplant endommagement et frottement. *Revue européenne des éléments finis*, 10(02–03–04) :489–503, 2001.
- [A26] M. Jean, V. Acary, and Y. Monerie. Non smooth contact dynamics approach of cohesive materials. *Philosophical Transactions : Mathematical, Physical & Engineering Sciences, The Royal Society, London A*, A359(1789) :2497–2518, 2001.

## Articles under review

- [UR1] M. Haddouni, V. Acary, S. Garreau, J.D. Beley, and B. Brogliato. Comparison of several numerical schemes for the resolution of index-3, index-2 and index-1 daes in the context of nonsmooth frictionless multibody dynamics. *Multibody Systems Dynamics*, 2014. in revision.

## Communications in conference proceedings

- [C1] Bin Wang, B. Brogliato, V. Acary, Ahsene Boubakir, and F. Plestan. Experimental comparisons between implicit and explicit implementations of discrete-time sliding mode controllers : towards chattering suppression in output and input signals. In *VVS 2014 - IEEE International Workshop on Variable Structure Systems*, pages 1–6, Nantes, France, 2014.
- [C2] O. Huber, V. Acary, and B. Brogliato. Enhanced matching perturbation attenuation with discrete-time implementations of sliding-mode controllers. In *ECC - 13th European Control Conference*, pages 2606–2611, Strasbourg, France, June 2014. IEEE.

- [C3] O. Huber, V. Acary, B. Brogliato, and F. Plestan. Discrete-time twisting controller without numerical chattering : analysis and experimental results with an implicit method. In *CDC 2014 - IEEE 53rd Annual Conference on Decision and Control*, Los Angeles, United States, September 2014. IEEE.
- [C4] Valentina Sessa, Luigi Iannelli, V. Acary, B. Brogliato, and Francesco Vasca. Computing Period and Shape of Oscillations in Piecewise Linear Lur'e Systems : a Complementarity Approach. In *CDC 2013 - 52nd IEEE Conference on Decision and Control*, Firenze, Italy, October 2013.
- [C5] O. Huber, V. Acary, and B. Brogliato. Comparison between explicit and implicit discrete-time implementations of sliding-mode controllers. In *CDC 2013 - 52nd IEEE Conference on Decision and Control*, Florence, Italy, October 2013.
- [C6] M. Haddouni, V. Acary, and J.-D. Beley. Comparison of index-3, index-2 and index-1 DAE solvers for nonsmooth multibody systems with unilateral and bilateral constraints. In *Multibody Dynamics 2013*, Zagreb, Croatia, May 2013. Eccomas.
- [C7] V. Acary, M. Brémond, Konstantinos Kapellos, Jan Michalczyk, and Roger Pissard-Gibollet. Mechanical simulation of the Exomars rover using Siconos in 3DROV. In *ASTRA 2013 - 12th Symposium on Advanced Space Technologies in Robotics and Automation*, Noordwijk, Netherlands, May 2013. ESA/ESTEC.
- [C8] H.B. Oza, V. Acary, Y.V. Orlov, S.K. Spurgeon, and B. Brogliato. Finite time tracking of unilaterally constrained planar systems with pre-specified settling time : Second order sliding mode synthesis and chattering-free digital implementation. In *Decision and Control (CDC), 2012 IEEE 51st Annual Conference on*, pages 5471–5476, Dec 2012.
- [C9] Q. Z. Chen, V. Acary, G. Virlez, and O. Brüls. A Newmark-Type Integrator for Flexible Systems Considering Nonsmooth Unilateral Constraints. In Peter Eberhard, editor, *The Second Joint International Conference on Multibody System Dynamics - IMSD 2012*, Stuttgart, Germany, March 2012. ASME (American Society of Mechanical Engineers), IFToMM (International Federation for the Promotion of Mechanism and Machine Science), IUTAM (International Union of Theoretical and Applied Mechanics), KSME (Korean Society of Mechanical Engineers) and JSME.
- [C10] V. Acary, C.I. Morarescu, F. Périignon, and B. Brogliato. Numerical simulation of nonsmooth systems and switching control with the siconos/control toolbox. In *6th Euromech Nonlinear Dynamics Conference, ENOC 2008*, St Petersburg., 29 June 2008.
- [C11] M. Renouf and V. Acary. Comparison and coupling of algorithms for collisions, contact and friction in rigid multi-body systems. In C.A. Mota Soares et.al., editor, *III European Conference on Computational Mechanics Solids, Structures and Coupled Problems in Engineering (ECCM)*, Lisbon, Portugal, June 2006.
- [C12] V. Acary. An overview of Non Smooth Dynamical Systems. Moreau's Sweeping Process, Higher order systems and links with optimization. In C. Lemaréchal, F. Jarre, and J. Zowe, editors, *Optimization and its applications.*, Oberwolfach, Germany, 2005. Oberwolfach reports. Springer Verlag.
- [C13] V. Acary and B. Brogliato. Numerical time integration of higher order dynamical systems with state constraints. In Dick H. van Campen, editor, *ENOC-2005*, Eindhoven, Netherlands, 2005. Technical University Eindhoven Tu/e.
- [C14] V. Acary and D.-E. Taha. Concurrent Multiple impacts in rigid bodies : Formulation and simulation. In Dick H. van Campen, editor, *ENOC-2005*, Eindhoven, Netherlands, 2005. Technical University Eindhoven Tu/e.
- [C15] M. Renouf, V. Acary, and G. Dumont. 3D frictional contact and impact multibody dynamics. A comparison of algorithms suitable for real-time applications. In *ECCOMAS Thematic Conference Multibody Dynamics 2005*, Madrid, June 2005.
- [C16] V. Acary and B. Brogliato. Concurrent multiple impacts modelling - case-study of a 3-ball chain. In K. J. Bathe, editor, *Second MIT conference on computational Fluid and Solid Mechanics*, pages 1842–1847. Elsevier, June 2003.

- [C17] V. Acary and M. Jean. Numerical modeling of three dimensional divided structures by the non smooth contact dynamics method : Application to masonry structure. In B.H.V. Topping, editor, *The Fifth international Conference on Computational Structures Technology 2000*, pages 211–222. Civil-Comp Press, 6-8 September 2000.
- [C18] V. Acary, J.-Y. Blaise, P. Drap, M. Florenzano, S. Garrec, M. Jean, and D. Merad. NSCD method applied to mechanical simulation of masonry in historical buildings using MOMA. In *XVII CIPA International Symposium*, Brazil, 1999.
- [C19] V. Acary and M. Jean. Numerical simulation of monuments by the contacts dynamics method. In DGEMN-LNEC-JRC, editor, *Monument-98, Workshop on seismic performance of monuments*, pages 69–78. Laboratório Nacional de engenharia Civil (LNEC), November 12-14 1998.

## Communications in conferences based on small papers or abstracts

- [Co1] M. Haddouni, V. Acary, S. Garreau, J.D. Beley, and B. Brogliato. Numerical time integration schemes for nonsmooth multibody systems in the event-driven framework. In S. Idelsohn, V. Sonzogni, A. Coutinho, M. Cruchaga, A. Lew, and M. Cerrolaza, editors, *1st Pan-American Congress on Computational Mechanics - PANACM 2015*, Buenos Aires, April 2015.
- [Co2] V. Acary, Hidde De Jong, and B. Brogliato. Numerical simulation of piecewise-linear models of gene regulatory networks using complementarity systems (Extended Abstract). In *MTNS 2014 - 21st International Symposium on Mathematical Theory of Networks and Systems*, Groningen, Netherlands, July 2014.
- [Co3] O. Brüls, V. Acary, and Alberto Cardona. A Penetration-free Nonosmooth Dynamics Method for Frictionless Contact/Impact Problems. In *WCCM XI - 11th World Congress on Computational Mechanics - 5th European Conference on Computational Mechanics (ECCM V) 6th European Conference on Computational Fluid Dynamics (ECFD VI)*, Barcelona, Spain, July 2014. Eugenio Oñate.
- [Co4] O. Brüls, V. Acary, and Alberto Cardona. The nonsmooth generalized- $\alpha$  scheme with a simultaneous enforcement of constraints at position and velocity levels. In *ENOC 2014 - European Nonlinear Oscillations Conference*, Vienna, Austria, July 2014.
- [Co5] N. Akhadkar, V. Acary, B. Brogliato, and M. Abadie. Analysis of four-bar planar mechanisms with joint clearances. In *ENOC 2014 - European Nonlinear Oscillations Conference*, Vienna, Austria, July 2014.
- [Co6] V. Acary, Guillaume James, and F. Pérignon. Periodic motions of coupled impact oscillators. In *11th World Congress on Computational Mechanics (WCCM XI) 5th European Conference on Computational Mechanics (ECCM V) 6th European Conference on Computational Fluid Dynamics (ECFD VI)*, Barcelona, Spain, July 2014.
- [Co7] V. Acary, Guillaume James, and F. Pérignon. Periodic motions of coupled impact oscillators. In *ENOC 2014 - 8th European Nonlinear Dynamics Conference*, Vienna, Austria, July 2014.
- [Co8] V. Acary and M. Brémond. An open question : How to solve efficiently 3D frictional contact problem? *Computational Contact Mechanics : Advances and Frontiers in Modeling Contact* (14w5147), February 2014.
- [Co9] V. Acary. Ordinary differential equations with discontinuous right-hand sides as complementarity systems. Application to gene regulatory networks. In *Fourth International Conference on Continuous Optimization (ICCOPT 2013)*, Lisbon, Portugal, July 2013.
- [Co10] T. Schindler and V. Acary. Application of timestepping schemes based on time discontinuous Galerkin methods to multi-dimensional examples. In *Euromech 514 - New trends in Contact Mechanics*, Cargèse, France, March 2012. M. Raous, Peter Wriggers.
- [Co11] V. Acary. Numerical simulation of piecewise-linear models of gene regulatory networks using complementarity systems. In D. Sun and Toh K.-C., editors, *Workshop 3 on Complementarity And Its Extensions*. IMS, Institute for Mathematical Sciences. National university of Singapore, 17–21 December 2012. <http://www2.ims.nus.edu.sg/Programs/012opti/wk3.php>.

- [Co12] S. Greenhalgh, V. Acary, and B. Brogliato. Preservation of dissipativity properties with the (theta, gamma)-discretization. In *AMMCS. International Conference on Applied Mathematics, Modeling and Computational Science*, Waterloo, Canada, March 2011. SIAM/AIMS.
- [Co13] T. Schindler and V. Acary. Timestepping Schemes Based On Time Discontinuous Galerkin Methods. In *ICIAM 2011 – 7th International Congress on Industrial and Applied Mathematics*, Vancouver, Canada, March 2011. SIAM.
- [Co14] T. Schindler and V. Acary. Timestepping Schemes Based On Time Discontinuous Galerkin Methods. In *EUROMECH Colloquium 516. Nonsmooth contact and impact laws in mechanics*, Grenoble, France, March 2011. EUROMECH INRIA.
- [Co15] V. Acary and O. Bonnefon. Time integration of nonsmooth mechanical systems with unilateral contact. Conservation and stability of position and velocity constraints in discrete time. In *7th European Nonlinear Dynamics Conference (ENOC 2011)*, Rome, Italy, May 2011. EUROMECH.
- [Co16] V. Acary. Higher order schemes for nonsmooth mechanical systems. In M. Arnold, R. Weiner, B.P. Sommeijer, and J. G. Verwer, editors, "*NUMDIFF-12*" on Numerical Solution of Differential and Differential-Algebraic Equations, Halle (Saale), Germany, 2009.
- [Co17] V. Acary and B. Brogliato. Implicit Euler numerical simulation of sliding mode systems. In *Conference on Scientific Computing. Conference in honour of E. Hairer's 60th birthday*, Geneva, Switzerland, 2009. M. Gander, C. Lubich and G. Wanner.
- [Co18] V. Acary, F. Cadoux, C. Lemarechal, and J. Malick. Second-order cone optimization for unilateral contact with Coulomb friction. In *5th Contact Mechanics International Symposium, CMIS 2009*, Chania, Greece, 2009.
- [Co19] V. Acary. The Siconos software. A open–source software platform for the modeling, the simulation and the control of nonsmooth mechanical and electrical systems. In *Advanced COmputational Methods in ENgineering, ACOMEN 2008*, Liege, Belgium, 2008.
- [Co20] V. Acary, H. Khenous, and F. P erignon. Numerical Methods for 3D Coulomb's Friction based on Nonsmooth Newton's Method and Nonlinear Complementarity Formulations. In *ECCOMAS 2008*, Venice, Italy, July 2008.
- [Co21] V. Acary, F. Cadoux, C. Lemarechal, and J. Malick. An algorithm for Coulomb's frictional contact. In *CANUM 2008. 39e Congr es National d'Analyse Num erique*, Saint Jean de Monts, Vend ee, France, 2008.
- [Co22] V. Acary, F. Cadoux, C. Lemarechal, and J. Malick. A non-smooth optimization method for the friction problem in computational mechanics. In *SMAI,Groupe MODE*, Clermont-Ferrand, France, 2008.
- [Co23] V. Acary. New event-capturing Time-Stepping Schemes with Higher resolution and order for Nonsmooth Multibody Systems. In *8th. World Congress on Computational Mechanics (WCCM8) 5th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)*, Venice, Italy, 2008.
- [Co24] V. Acary. Investigations toward higher resolution time–stepping schemes for NonSmooth MultiBody Systems (NSMBS). In *CSMA Days, Computational structural Mechanics association*, Nantes, France, April 2008.
- [Co25] V. Acary. Numerical methods and software for non smooth dynamical systems. the siconos platform. In *5th International School. Topics in nonlinear dynamics : Analysis, bifurcations and control of piecewise- smooth and hybrid dynamical systems*, Naples, September 2006. <http://www.dis.unina.it:8080/pws-school/action.show?name=homePage>.
- [Co26] V. Acary and B. Brogliato. Simulation of higher-order linear complementarity systems : an extension of Moreau's sweeping process. In *Colloque en l'honneur du 80<sup> me</sup> anniversaire de Jean Jacques Moreau*, November 2003.



## Reviewed national conferences

- [CN1] M. Haddouni, V. Acary, J.-D. Beley, and S. Garreau. Comparison of index-2 and index-1 DAE solvers for nonsmooth multibody systems with unilateral or bilateral constraints. In *CSMA 2013 - 11e Colloque National en Calcul des Structures*, Giens, France, February 2013. CSMA.
- [CN2] Vincent Acary. Méthodes Numériques pour la simulation des systèmes multi-corps en présence de contact, de frottement et d'impacts. In *Plenary lecture at JNRR'09 - 7èmes Journées Nationales de la Recherche en Robotique*, Neuvy-Sur-Barangeon, France, November 2009.
- [CN3] V. Acary and B. Brogliato. Toward a multiple impact law : the 3-ball chain example. In *6ème Colloque National en Calcul des Structures, GIENS 2003*, page 12p., Giens Var, France, 2003.

## Main research and technical reports

- [TR1] J. Michalczyk, M. Brémond, V. Acary, and R. Pissard-Gibollet. Exomars Rover Mechanical Modeling with Siconos. Technical Report RT-0448, INRIA, July 2014.
- [TR2] V. Acary, M. Brémond, T. Koziara, and F. Pérignon. FCLIB : a collection of discrete 3D Frictional Contact problems. Technical Report RT-0444, INRIA, February 2014.
- [TR3] V. Acary and F. Pérignon. An introduction to Siconos. Technical Report TR-0340, INRIA, <http://hal.inria.fr/inria-00162911/en/>, 2007.
- [TR4] V. Acary and Y. Monerie. Nonsmooth fracture dynamics using a cohesive zone approach. Research Report RR-6032, INRIA, 2006.
- [TR5] P. Denoyelle and V. Acary. The non-smooth approach applied to simulating integrated circuits and power electronics. Evolution of electronic circuit simulators towards fast-SPICE performance. *INRIA Research Report 0321*, <http://hal.inria.fr/docs/00/08/09/20/PDF/RT-0321.pdf>, 2006.
- [TR6] V. Acary and B. Brogliato. Coefficients de restitution et efforts aux impacts : Revue et comparaison des estimations analytiques. Research Report RR-5401, INRIA, 2004.
- [TR7] V. Acary and M. Jean. Simulation numérique des édifices composés de blocs. Technical report, Rapport d'activité du projet collectif de recherche, Palais des Papes, 18 Décembre 1998.

## Dissemination

- [D1] Collectif. Les maths ont la bosse de l'industrie. *L'usine nouvelle*, 2011. Participation à la rédaction de l'article.

## Patents

- [P1] V. Acary, O. Bonnefon, and B. Brogliato. Improved circuit simulator. Patent number 09/02605, May 2009.

## Seminar

- 16/11/2007. ETH Zürich. Investigations toward higher resolution time-stepping schemes for NonSmooth Multibody Systems (NSMBS)
- 10/04/2008 LAMCOS. Laboratoire de Mécanique des contacts et de structures. INSA. UMR CNRS 5259. Lyon. Autour de la dynamique non régulière : Méthodes d'intégration numérique et la plateforme Siconos.
- 10/10/2008. LMGC. Laboratoire de Mécanique et de Génie Civil. UMR CNRS UMR 5508. Montpellier. Nonsmooth dynamical systems. Numerical time integration schemes and the Siconos platform

- 27/11/2012. LMA. Laboratoire de Mécanique et d’Acoustique. UPR CNRS 7050. Marseille. Une extension de type Newmark du schéma Moreau–Jean pour l’intégration de la dynamique en présence de contact et de frottement.
- 20/09/2013. XLIM. Institut de recherche. UMR CNRS 7252, Limoges. Une extension du schéma Moreau–Jean sur la base de schémas généralisés  $\alpha$  pour l’intégration de la dynamique en présence de contact et de frottement.
- 02/04/2014. CMM. Center of Mathematical Modeling. Universidad de Chile. Santiago de Chile. Ordinary differential equations with discontinuous right-hand sides as complementarity systems. Application to gene regulatory networks.
- 02/04/2014. CMM. Center of Mathematical Modeling. Universidad de Chile. Santiago de Chile. Ordinary differential equations with discontinuous right-hand sides as complementarity systems. Application to gene regulatory networks.
- 18/05/2015. Centro de Innovación UC - Pontificia Universidad Católica de Chile. Jornada científica INRIA Chile. The nonsmooth contact dynamics method for the simulation of granular matter flows and fracture in mining applications
- 27/08/2015. CMM. Center of Mathematical Modeling. Universidad de Chile. Santiago de Chile. The nonsmooth contact dynamics method for the simulation of granular matter flows and fracture in mining applications
- 12/11/2015. Modeling and simulation of mechanical systems with contact and friction within the nonsmooth contact dynamics framework. Possible applications in geosciences. Seminario del Departamento de Ingeniería Matemática. Universidad de Concepción

## PhD Thesis supervisions

- Doh-Elvis Taha [November 2004 – September 2005 ; Inria - Scheider Electric grant. Withdrawal after one year. Co-supervisor Bernard Brogliato, amount of supervision involved : 50%] *Title : Modeling of multiple impacts in circuit breakers.* Associated publication with the student : [C14]
- Florent Cadoux [September 2006 – September 2009 ; “Ecole Polytechnique” grant. PhD thesis of the University Joseph Fourier- Grenoble I, defended on 26/11/2009. (now associate professor, titulaire de la chaire industrielle ERDF ”smartgrids” at Fondation Partenariale Grenoble INP). Co-supervisor Claude Lemaréchal, amount of supervision involved : 50%] *Title : Optimization and convex analysis for nonsmooth dynamics.* Associated publications with the student : [A18, CiB2, A19, Co18, Co22, Co21]
- Olivier Huber [September 2011 – May 2015 ; “Allocataire Normalien” grant. Co-supervisor Bernard Brogliato, amount of supervision involved : 50%. PhD thesis of the University Joseph Fourier- Grenoble I, defended on 05/05/2015. ] *Title : Discretization methods for sliding mode control.* Associated publications : [C5, C2, C3, A4, A5, CiB1]
- Mounia Haddouni [May 2012 – May 2015 ; CIFRE ANSYS grant. Co-supervisor Bernard Brogliato, amount of supervision involved : 80%. PhD thesis of the University Joseph Fourier- Grenoble I, defended on 27/05/2015] *Title : Algorithms for solving the dynamics of contact and friction.* Associated publications : [C6, CN1, UR1]
- Narendra Akhakar [December 2012 – April 2016] ; Schneider Electric grant. Co-supervisor Bernard Brogliato, amount of supervision involved : 80%.] *Title : Numerical modeling of mechanisms. Influence of the clearances, the flexibility and the multiple impacts..* Associated publication : [Co5, ?]

## Supervision of doctoral internships and post-doctoral fellows

- Mathieu Renouf [post doc Bipop-Siames, October 2004 – September 2005 ; INRIA grant.] (now CNRS researcher at LMGC Montpellier.) Supervision ratio 100%. Publications : [C15, C11]. The work of Mathieu Renouf concerned the comparison of numerical algorithms for frictional contact problems in a real-time context. This was carried out with the INRIA Project Team, Siames of IRISA where the post-doc spent 6 months.

- Houari Khenous [post-doc September 2006 – September 2007 ; INRIA grant.] (now research engineer IFPEN Paris). Supervision ratio 100%. Publication : [Co20].  
This post-doc concerned the optimization and the implementation in Siconos of semismooth Newton methods for solving frictional contact problems based on Nonlinear Complementarity Problems (NCP) formulations [B2].
- Carmina Georgescu [post-doc Octobre 2009 – Mars 2011 ; INRIA grant.] (now assistant professor University of Bucarest, Romania). Supervision ratio 50%. Publication : [A17]  
This joint post doc fellow with Hidde de Jong (INRIA Team project Ibis) concerned the numerical simulation of piecewise-linear models of gene regulatory networks using complementarity systems in Siconos.
- Thorsten Schindler [post-doc Novembre 2010 – Novembre 2011 ; ANR Saladyn grant.] (now associate professor. Lehrstuhl für Angewandte Mechanik. Technische Universität München). Supervision ratio 100%. Publications : [A8, Co10, Co13, Co14, A12].  
With Thorsten Schindler, we developed new event-capturing time-stepping schemes for nonsmooth mechanical systems based on time discontinuous Galerkin methods.
- Scott Greenhalgh [PhD internship Septembre 2010 – Mai 2011 ; ANR Saladyn grant.] (former post-doc Yale University and now associate at Queen’s University). Supervision ratio 50%. Publications : [Co12, A13].  
With Scott Greenhalgh who was in internship in our team as PhD candidate, we worked in the preservation of dissipation properties for linear complementarity systems when a time-discretization technique is used.
- Valentina Sessa [PhD internship Septembre 2012 – Février 2013 ; ANR Saladyn grant.] (now associate professor at IMPA, Rio de Janeiro, Brazil). Supervision ratio 100%. Publications : [C4, ?].  
With Valentina Sessa who was in internship in our team as PhD candidate, we study and develop a numerical algorithm for computing periodic solutions of linear complementarity systems with applications to electrical circuits
- Bin Wang [post-doc Septembre 2012 –Septembre 2013 ; ANR Chaslim grant.] Supervision ratio 50%. Publications : [C1, A7]. The post doc of Bin Wang concerned the experimental validation of the implicit sliding mode control discretization on a experimental set-up located at IRCCYN (ECN, Nantes).

## Supervision of research internships

- Christophe Merle [DEA Mécanique/Stage de fin d’étude Ingénieur ESM2 February 2002–September 2002. Grant Schneider Electric] • Rami Ch’kir [DEA Mécanique/Stage de fin d’étude Ingénieur ESM2 February 2003–September 2003.] • Alexandre Ravoux [DESS Génie informatique. January-June 2004 ; Grant Siconos] • Jean-Michel Barbier [DESS Génie informatique. January-September 2004 ; Grant Siconos] • Jérémie Blanc-Tranchant [DESS Génie informatique. January-June 2004 ; Grant Siconos] • Jean-Baptiste Charlety [DESS Génie informatique. January-June 2004 ; Grant Siconos] • Pascal Denoyelle [Master 2 IMSN. March–August 2005. Grant Siconos] • François Garrigues [ENSIMAG 4A. May– August. 2006 Grant Siconos ] • Abdelaziz N’Diaye [ENSIMAG 2A May–July 2006. Grant Siconos] • Tomasz Toczek [ENSERG 2A. May–August 2006. ] • Walid Ben Romdhane [Ecole polytechnique de Tunisie. February–August 2008. Grant internship INRIA] • Hakim Majidi [Master 1 MAI Grenoble. April–July 2008] • Sullivan Hamard [ENSE<sup>3</sup> Stage de fin d’étude Ingénieur] • Jean-Nicolas Roussel [Ecole Polytechnique 2A. January–July 2015. ] • Thomas Lepoutre [Ecole Centrale Marseille. Stage césure. July–December 2015 ] • Charles-Édouard Ladari [Ecole Centrale Paris. Stage césure. September–December 2015 ]

## Supervision of non permanent research and development engineers.

- Jean-Michel Barbier [October 2004 – April 2005 ; Grant Siconos] • Jean-Baptiste Charlety [October 2004 – April 2005 ; Grant Siconos] (now software quality engineer at EMC). • Pascal Denoyelle [September 2005 — February 2008 ; Grant Ingénieur spécialiste INRIA] (now R&D engineer Mentor Graphics). • Franck Perignon [April 2005 – September 2008 ; Grant Siconos] (now CNRS research engineer). • Olivier

Bonnefon [January 2007 – August 2009 ; Grant VAL-AMS ; September 2009 – August 2011 Grant Saladyne] (now INRA research engineer). • Laurent Schiavon [ January – March 2009 ; Grant Saladyne] (R&D engineer, OPEN Saint Egrève) • Hong Ha Do Nguyen [January – December 2012 ; Grant Saladyne] (R&D engineer Singapore.) • Jan Michalcsyk [September 2012 – September 2014 ; Grant ADT INRIA] (now Expert Engineer INRIA.) • Maximiliano Olivares [April 2015 – ; INRIA Chile engineer] (now Expert Engineer INRIA.) • Stephen Sinclair [December 2015 – ; Grant ADT INRIA]

## Supervision/Collaboration with permanent research engineers

- Franck Pérignon, IR CNRS. Laboratory LJK. With Franck Pérignon, I work partly on refactoring of the foundation of Siconos since 2008 and the computation of waves propagation and periodic solutions with impact [Co7] since 2013.
- Maurice Brémond, IR INRIA Grenoble. M. Brémond is the main engineer in Siconos in charge of maintenance, support and packaging. He also made great contributions to siconos for the functionalities and the architecture.

## PhD thesis Jury

- Hadia Ramal. Université de Limoges, "Problèmes de complémentarité aux valeurs propres : théorie, algorithmes et applications" supervised by Samir Adly. 19/09/2013. Examiner

## Foreign Jury of Master Thesis

- Matteo Fancello. "A Co-Simulation Approach for Mixed Smooth and Nonsmooth Dynamics in Multibody Problems". Politecnico di Milano, Facoltà di Ingegneria Industriale, Corso di Laurea di Ingegneria Spaziale. Tesi di Laurea. 2012. Reviewer

## Colloquia and summer school organizations

- 2005. Siconos/DaVinci conference. INRIA Rhône-Alpes, July 8–9 2005, Grenoble France
- 2005. CEA-INRIA-EDF school<sup>1</sup>. *Nonsmooth Dynamical Systems. Analysis, Control, Simulation and Applications*. June 29–02 2006. INRIA Rocquencourt, France.
- 2010. Summer School INRIA<sup>2</sup>. *Nonsmooth Contact Mechanics : Modeling and Simulation* June 14–18 2010 Centre Paul Langevin, Aussois, France
- 2012. EUROMECH Colloquium [516]<sup>3</sup>. *Nonsmooth contact & impact laws in mechanics*. July 6th - 8th 2011 Grenoble, France
- 2012. Summer School INRIA<sup>4</sup>. *Nonsmooth Contact Mechanics : Modeling and Simulation* September 9–14 2012 Centre Paul Langevin, Aussois, France
- 2014. WCCM-ECCM-ECFD conference<sup>5</sup>. Co-organizer with Mathias Legrand of a mini-symposium entitled Nonsmooth Dynamics and Vibrations. July 20–25 2014, Barcelona, Spain.
- 2014. Workshop BIRS Center<sup>6</sup>. co-organizer with Robert Bridson (University of British Columbia), Danny Kaufman (Adobe Research), Jong-Shi Pang (University of Southern California), and Jeff Trinkle (Rensselaer Polytechnic Institute). *Computational Contact Mechanics : Advances and Frontiers in Modeling Contact (14w5147)*. February 16–21 2014. The Banff International Research Station (BIRS) for Mathematical Innovation and Discovery. Baff, Alberta, Canada.

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1. <http://www.inrialpes.fr/bipop/schoolnonsmooth/>

2. <http://www.inrialpes.fr/bipop/NonSmoothMechanicsSeminars/BipopSpringSchool2010/index.html>

3. <http://www.inrialpes.fr/bipop/NonSmoothMechanicsSeminars/Euromech2011/index.html>

4. <http://www.inrialpes.fr/bipop/NonSmoothMechanicsSeminars/BipopSummerSchool2012/index.html>

5. <http://www.wccm-eccm-ecfd2014.org/admin/Files/FileAbstract/a154.pdf>

6. <https://www.birs.ca/events/2014/5-day-workshops/14w5147>

## Participation in membership on editorial boards of conference

- [2012– ] **Member of the EUROMECH Nonlinear Oscillations Conference Committee** (ENOC Committee <sup>7</sup>)[selection of the location of the conference, organization of the review process, choice of the plenary lectures, the mini-symposium, the best paper award].

Presently, ENOCs are the largest, high-quality, scientific events in the broad area of nonlinear dynamics not only in Europe but on a worldwide basis. Since 1992, the European Mechanics Society (EUROMECH) organizes European Nonlinear Oscillations Conferences (ENOCs) through the European Nonlinear Oscillations Conference Committee (ENOCC). Actually, these events have a much longer tradition, since they are successors of the former ICNO (International Conference on Nonlinear Oscillations) series held from 1961 to 1990 in East-European countries. Starting from the 1st International Conference on Nonlinear Oscillations in Kiev, 1961, twelve ICNOs were organized till 1990. Then, starting with the 1st European Nonlinear Oscillations Conference in Hamburg, 1992, eight ENOCs were organized till 2014 (Prague, Copenhagen, Moscow, Eindhoven, St. Petersburg, Rome, Vienna).

## Scientific animation

- **Co-founder and animator of the European network for nonsmooth dynamics** <sup>8</sup>

The goals of the European network for nonsmooth dynamics are : to provide a cooperation platform for researchers specialized in nonsmooth dynamics, to promote the research focussed on nonsmooth dynamics and its applications, to improve networking activities (summer school, workshops or conferences), to disseminate the knowledge from the academic community to industry. The network organizes a two-days symposia each year with 8 up to 10 long talks. The network also coordinates proposition of mini-symposia in the main conferences of the domain.

## Administrative tasks inside INRIA

- Member of the CTP INRIA (Comité Technique Paritaire (CTP))[2006–2011] and then member of the CTI (Comité Technique INRIA (CTP))[2011–2014]
- Member of the center’s committee of INRIA Grenoble [2007-2011]
- Member of the CLFP (Commission Locale Formation Permanente) [2011–2014]

## Reviews of projects

- Reviewer for the National Science foundation (NSF, USA), the Netherlands Organisation for Scientific Research (NWO) and the Swiss National Science Foundation (SNSF).

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7. <http://enoc2014.conf.tuwien.ac.at/index.php/committees>

8. <http://ennsd.gforge.inria.fr/>

Year	Teaching	Hours	Level	Where
2013-2016	Nonsmooth dynamical systems simulation	9H Cours/TD	Master 2 recherche AC-SYON	Université de Limoges
2004-2009	Mathematics for Physics Femlab	30H Cours 18H TD	Master 2 Pro IMSN	Grenoble UFR IMAG.
2004-2006	Numerical Optimization	18 H TD	2 <sup>ème</sup> année	Grenoble ENSIMAG
2002-2003	Numerical analysis	30H Cours	DESS modélisation Numerical Simulation	Grenoble UFR de Physique
2001-2002	Mechanical Vibrations Mechanical Vibrations  Mathematics for engineers	16H TD 12H TD  27H TD	IUT GMP 2 <sup>ème</sup> année Maîtrise mécanique UJF DEUG STPI 2 <sup>ème</sup> année	Grenoble UFR de Mécanique  UFR IMAG
2000-2001	Continuum Mechanics	20H TD	ESIM 1 <sup>ère</sup> année	Marseille
1999-2000	Continuum Mechanics Numerical Methods Projects supervision (12)	20H TD 24 H TD 24 H TD	ESIM 1 <sup>ère</sup> année ESIM 2 <sup>ème</sup> année ESIM 2 <sup>ème</sup> année	Marseille
Summer school and professional education				
2005	Nonsmooth Dynamical Systems. Simulation and Applications	6H	Summer school CEA-INRIA-EDF. Rocquencourt	
2006	Numerical methods and software for non smooth dynamical systems.	6H	Summer school Topics in Non-linear Dynamics. Naples	
2010, 2012	Nonsmooth Mechanical Systems. Modeling and simulation	9H	Summer school INRIA. Aussois	
2013	Nonsmooth Mechanical Systems. Modeling and simulation	6H	ANSYS internal formation. Lyon	

Fait à Montbonnot le 14 avril 2017

Vincent Acary