

Antoine Laurain

Phone : +55(11) 3091 6304
Secretaria : +55(11) 3091-6136/6131
Email : laurain@ime.usp.br



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1 General informations

Expertise : shape and topology optimization, inverse problems, shape and parameter identification, image analysis, free boundary problems, asymptotic analysis, optimal control, calculus of variations.

Date and place of Birth : 08 June 1979, Nancy (France)

Nationality : Belgian / French

Post address : Universidade de São Paulo, Instituto de Matemática e Estatística
Departamento de Matemática Aplicada
Rua do Matão, 1010
Cidade Universitária, CEP 05508-090
São Paulo SP, Brazil

Office : Bloco B, room 109.

Office phone : +55(11) 3091 6304

Email : laurain@ime.usp.br

Webpages : <http://www.antoinelaurain.com>
https://www.researchgate.net/profile/Antoine_Laurain
<https://scholar.google.com/citations?user=TzMtBHwAAAAJ&hl=en&oi=sra>

2 Professional experience

- 07/2017- ... Associate Professor, Department of Applied Mathematics,
Institute of Mathematics and Statistics, University of São Paulo, Brazil.
- 04/2015-07/2017 Assistant Professor, Department of Applied Mathematics,
Institute of Mathematics and Statistics, University of São Paulo, Brazil.
- 03/2012-04/2015 Head of project "Inverse Problems" (Nachwuchsgruppenleiter "Inverse Probleme")
Department of Mathematics, Technical University of Berlin, Germany.
- 10/2010-02/2012 Research fellow (Wissenschaftlicher Mitarbeiter)
Department of Mathematics, Humboldt University of Berlin, Germany.
- 04/2010-10/2010 W2-Professorship (replacement position-Vertretungsprofessor),
University RWTH Aachen, Germany.
- 09/2006-04/2010 Postdoc in the START Project : "Interfaces and Free Boundaries",
University Karl-Franzens, Graz, Austria.

3 Education

- 2017 **Habilitation (Livre-docência),**
Title : "Shape optimization techniques for inverse problems"
Institute of Mathematics and Statistics, University of São Paulo, Brazil.
- 2003-2006 **PhD in Mathematics,**
Dissertation : "Singularly perturbed domains in shape optimization"
Advisor : Jan Sokolowski, University Henri Poincaré, Nancy, France.
- 2002-2003 **MSc in Mathematics (DEA),**
Partial differential equations-Probability,
University Henri Poincaré, Nancy, France.
- 2001-2002 **MA in Mathematics (Maîtrise),**
University Henri Poincaré, Nancy, France.
- 2000-2001 **BA in Mathematics (Licence),**
University Henri Poincaré, Nancy, France.
- 1997-2000 **Classes préparatoires MP,**
Lycée Fabert, Metz, France.
- 1997 **Baccalauréat série S spécialité Mathématiques,**
Lycée Fabert, Metz, France.

4 Publications

The asterisks * mark the ten most important publications.

4.1 Refereed journals

- 31) *Analysing smooth and singular domain perturbations in level set methods*
A. Laurain
SIAM Journal on Mathematical Analysis, 50(4), 4327-4370. (44 pages) (2018)
<https://doi.org/10.1137/17M1118956>
- 30)* *A level set-based structural optimization code using FEniCS*
A. Laurain
Structural and Multidisciplinary Optimization,
<https://doi.org/10.1007/s00158-018-1950-2> (2018)
- 29)* *Properties of optimizers of the principal eigenvalue with indefinite weight and Robin conditions*
J. Lamboley, A. Laurain, G. Nadin and Y. Privat
Calculus of Variations and Partial Differential Equations (2016) 55 : 144.
DOI :10.1007/s00526-016-1084-6
- 28)* *Stability Analysis of the Reconstruction Step of the Voronoi Implicit Interface Method*
A. Laurain
SIAM Journal on Numerical Analysis, Vol. 55, No. 1, pp. 1–30 (2017).
DOI : <http://dx.doi.org/10.1137/15M1046290>
- 27) *Shape and parameter reconstruction for the Robin transmission inverse problem*
A. Laurain, H. Meftahi
Journal of Inverse and Ill-posed Problems. Volume 24, Issue 6, Pages 643-662, ISSN (Online) 1569-3945, ISSN (Print) 0928-0219,
DOI : 10.1515/jiip-2015-0008, May 2016
- 26) *A first order approach for worst-case shape optimization of the compliance for a mixture in the low contrast regime*
M. Dambrine, A. Laurain
Structural and Multidisciplinary Optimization (2016) 54 :215–231.
DOI : 10.1007/s00158-015-1384-z
- 25) *Shape optimization of an electric motor subject to nonlinear magnetostatics*
P. Gangl, U. Langer, A. Laurain, H. Meftahi, K. Sturm
SIAM J. Sci. Comput. Vol. 37, No. 6, pp. B1002-B1025 (2015)
DOI : 10.1137/15100477X
- 24)* *Distributed shape derivative via averaged adjoint method and applications*
A. Laurain, K. Sturm
ESAIM : Mathematical Modelling and Numerical Analysis 50 (2016) 1241-1267
DOI : <http://dx.doi.org/10.1051/m2an/2015075>

- 23)* *A new reconstruction method for the inverse source problem from partial boundary measurements*
A. Canelas, A. Laurain, A.A. Novotny
Inverse Problems 31 (2015) 075009,
DOI :10.1088/0266-5611/31/7/075009
- 22) *Shape sensitivities for an inverse problem in magnetic induction tomography based on the eddy current model*
M. Hintermüller, A. Laurain, I. Yousept.
Inverse Problems 31 (2015) 065006,
DOI :10.1088/0266-5611/31/6/065006
- 21)* *Droplet footprint control*
A. Laurain, S. Walker
SIAM J. Control Optim., 53(2), 771–799. (29 pages)
DOI :10.1137/140979721
- 20)* *A bilevel shape optimization problem for the exterior Bernoulli free boundary value problem*
H. Kasumba, K. Kunisch, A. Laurain
Interfaces and Free Boundaries 16(2014), 459-487
- 19) *A new reconstruction method for the inverse potential problem*
A. Canelas, A. Laurain, A.A. Novotny
Journal of Computational Physics 268 (2014), 417–431.
- 18)* *Global minimizers of the ground state for two phase conductors in low contrast regime*
A. Laurain
ESAIM : COCV 20 (2014), 362–388.
- 17) *A semismooth Newton method for a class of semilinear optimal control problems with box and volume constraints*
S. Amstutz, A. Laurain
Computational Optimization and Applications 56 (2013), no. 2, 369–403.
- 16) *Topological sensitivity analysis in fluorescence optical tomography*
A. Laurain, M. Hintermüller, M. Freiberger, H. Scharfetter
Inverse Problems 29 (2013) 025003.
- 15) *Minimization of the ground state for two phase conductors in low contrast regime*
C. Conca, A. Laurain, R. Mahadevan
SIAM Journal on Applied Mathematics : Vol. 72, No. 4 (2012), Pages 1238-1259.
- 14) *Principal Eigenvalue Minimization for an Elliptic Problem with Indefinite Weight and Robin Boundary Conditions*
M. Hintermüller, C.-Y. Kao, A. Laurain
Applied Mathematics & Optimization : Volume 65, Issue 1 (2012), Pages 111-146
- 13) *An image space approach to Cartesian based parallel MR imaging with total variation regularization*
S.L. Keeling, C. Clason, M. Hintermüller, F. Knoll, A. Laurain, G. Von Winckel
Medical Image Analysis, Volume 16, Issue 1, January 2012, Pages 189-200.
- 12) *A total variation based approach to correcting surface coil magnetic resonance images*
S.L. Keeling, M. Hintermüller, F. Knoll, D. Kraft, A. Laurain
Applied Mathematics and Computation, Volume 218, Issue 2, 15 September 2011, Pages 219-232
- 11) *Optimal shape design subject to variational inequalities*
M. Hintermüller and A. Laurain

- SIAM Journal on Control and Optimization, Vol.49 (2011), No.3, pp. 1015-1047.
- 10)* *Second-order topological expansion for electrical impedance tomography*
M. Hintermüller, A. Laurain and A.A. Novotny.
Advances in Computational Mathematics 36 (2012), no. 2, 235–265.
 - 9) *On a Bernoulli problem with geometric constraints*
A. Laurain and Y. Privat
ESAIM : Control, Optimisation and Calculus of Variations (2012), no. 1, 157–180.
 - 8) *Singular perturbations of curved boundaries in dimension three. The spectrum of the Neumann Laplacian.*
A. Laurain, S. Nazarov and J. Sokolowski,
Journal for Analysis and its Applications, Vol. 30 (2011), No. 2, pp. 148-180.
 - 7)* *Multiphase image segmentation and modulation recovery based on shape and topological sensitivity*
M. Hintermüller and A. Laurain,
Journal of Mathematical Imaging and Vision, September 2009, Vol. 35, No. 1, pp. 1-22.
 - 6) *On analysis of boundary value problems in nonsmooth domains*
G. Frémiot, W. Horn, A. Laurain, M. Rao and J. Sokolowski,
Dissertationes Mathematicae, 462 (2009), 149 pp.
 - 5) *Electrical Impedance Tomography : From Topology to Shape*
M. Hintermüller and A. Laurain,
Control and Cybernetics, special issue on the occasion of Jean-Paul Zolésio's 60th birthday,
Vol. 37, No. 4, 2008.
 - 4) *A shape and topology optimization technique for solving a class of linear complementary problems in function space*
M. Hintermüller and A. Laurain,
Computational Optimization and Applications, 2010, Vol. 46, No. 3, pp. 535-569
 - 3) *Levelset method with topological derivatives in shape optimization*
P. Fulmanski, A. Laurain, J.-F. Scheid and J. Sokolowski,
International Journal of Computer Mathematics, Vol. 85, No. 10, October 2008, pp. 1491-1514(24).
 - 2) *A level set method in shape and topology optimization for variational inequalities*
P. Fulmanski, A. Laurain, J.-F. Scheid and J. Sokolowski,
Int. J. Appl. Math. Comput. Sci., 2007, Vol. 17, No. 3, 413-430.
 - 1) *Structure of shape derivatives in non-smooth domains and applications*
A. Laurain,
Advances in Mathematical Sciences and Applications, Vol.15, No.1, 2005.

4.2 Conference proceedings

- 9) *A new method for the inverse potential problem based on the topological derivative*
A.A. Novotny, A. Canelas, A. Laurain

- Proceedings of the XXXIV Iberian Latin-American Congress on Computational Methods in Engineering
Z.J.G.N Del Prado (Editor), ABMEC, Pirenópolis, GO, Brazil, November 10-13, 2013.
- 8) *A Non-Iterative Method for the Inverse Potential Problem Based on the Topological Derivative*
Alfredo Canelas, Antoine Laurain, Antonio André Novotny,
Mini-Workshop : Geometries, Shapes and Topologies in PDE-based Applications. Oberwolfach
Report No. 57/2012 (DOI : 10.4171/OWR/2012/57).
 - 7) *Minimization of the ground state for two phase conductors in low contrast regime*
C. Conca, A. Laurain, R. Mahadevan
Mini-Workshop : Geometries, Shapes and Topologies in PDE-based Applications. Oberwolfach
Report No. 57/2012 (DOI : 10.4171/OWR/2012/57).
 - 6) *Using the topological derivative for initializing a Markov-chain Monte Carlo reconstruction
in fluorescence tomography*
M. Freiberger, A. Laurain, M. Hintermüller, A. Köstinger and H. Scharfetter
Proc. SPIE 8088, Diffuse Optical Imaging III, 80881Q (2011). (DOI :10.1117/12.889609).
 - 5) *Topological Derivative for Image Reconstruction in Fluorescence Tomography*
M. Freiberger, M. Hintermüller, A. Laurain and H. Scharfetter
Biomedizinische Technik/Biomedical Engineering. Volume 55, Issue s1, Pages 1–264,
44. DGBMT Jahrestagung Rostock (2010),
DOI : 10.1515/BMT.2010.447, October 2010
 - 4) *Numerical algorithms for an inverse problem in shape optimization*
M. Grzanek, A. Laurain and K. Szulc
6th International Conference on Inverse Problems in Engineering : Theory and Practice,
Journal of Physics : Conference series, Vol. 135 (2008) 012047.
 - 3) *Using self-adjoint extensions in shape optimization*
A. Laurain and K. Szulc
System modeling and optimization, 331–349, IFIP Adv. Inf. Commun. Technol., 312, Springer,
Berlin, 2009.
 - 2) *Une méthode levelset en optimisation de formes*
P. Fulmanski, A. Laurain, J.-F. Scheid and J. Sokolowski
ESAIM proceedings, (2007), Vol. 22, 162-168.
 - 1) *Level set method for shape optimization of Signorini problem*
P. Fulmanski, A. Laurain and J.-F. Scheid
MMAR proceedings (2004), Vol. 1, 71-75.

4.3 Submitted

- 1) *Distributed and boundary expressions of first and second order shape derivatives in nonsmooth domains*
A. Laurain

4.4 Chapters in book

- 1) *Topological derivatives and Levelset method in shape optimization*
P. Fulmanski, A. Laurain, J.-F. Scheid, J. Sokolowski, K. Szulc
in *Electrical Capacitance Tomography. Theoretical Basis and Applications*, pp 12-67
Dominik Sankowski and Jan Sikora, Eds, Wydawnictwo Ksiązkowe Instytutu Elektrotechniki
Warszaw 2010, ISBN 978-83-61956-00-6
DOI : 10.13140/2.1.4689.9849
- 2) *Elliptic Mathematical Programs with Equilibrium Constraints in Function Space : Optimality Conditions and Numerical Realization*
M. Hintermüller, A. Laurain, C. Löbhard, C. Rautenberg, T. Surowiec
in *Trends in PDE Constrained Optimization*, pp 133-153
Editors : G. Leugering, P. Benner, S. Engell, A. Griewank, H. Harbrecht, M. Hinze, R. Rannacher,
S. Ulbrich, International Series of Numerical Mathematics, 165
Springer International Publishing
DOI : 10.1007/978-3-319-05083-6_9

4.5 Technical reports

- 1) *Modulation recovery and image reconstruction in Parallel Magnetic Resonance Imaging : a structural study by parameterization*
M. Hintermüller, S.L. Keeling and A. Laurain
Technical University of Graz, SFB report no. 23, 2008.

4.6 Others

- 1) *Where to place a hole ?*
M. Hintermüller and A. Laurain,
ECMI Newsletter 41, march 2007.

4.7 Codes

- 1) *Level set-based 2D structural optimization using FEniCS*
<http://www.antoinelaurain.com/compliance.htm>
This educational code written for FEniCS is for compliance minimization in structural optimization, in two dimensions. The code is based on a level set formulation and on the distributed expression of the shape derivative, and exploits the powerful features of FEniCS to solve complicated PDEs with a simple implementation. The code is written for compliance minimization in the framework of linearized elasticity, but can be adapted for other functionals or other PDEs.

5 Grants & Projects

- 08/2018 - 08/2022 *“Optimization of finite-difference seismic wave solvers and their adjoints”*
This project is part of the major project *“Software technologies for simulation and inversion”* of the Research Centre for Gas Innovation of POLI-USP at the University of São Paulo (<http://www.rcgi.poli.usp.br/>). The project is funded by the company Shell, and consists of 11 principal investigators and a total of 64 participants. Our workstream is based at the Institute of Mathematics and Statistics (IME) of the University of São Paulo, and consists of three professors : Saulo R.M. Barros (Coordinator), Antoine Laurain (Principal Investigator), Pedro S. Peixoto (Principal Investigator), 1 Postdoctoral researcher, 3 PhD students and 3 MSc students.
This project focuses on developing a range of software technologies required for simulation and data inversion. Despite the fact that applications such as seismic imaging through data inversion predates the current surge in interest in data analytics and machine learning by many years, it remains an incredibly challenging problem due to the inherent complexity of the problem, large data volumes and high computational cost. The software required is highly specialized, both in terms of mathematics and high performance computing methods, and takes many person-years to develop. This poses a serious barrier to the development of new methods and innovation, for example to better image below salt layers commonly found off the coast of Brazil.
- 06/2017 - 05/2019 *Projeto de Pesquisa FAPESP - Regular, Processo : 2016/24776-6*
“Otimização de forma e problemas de fronteira livre”
FAPESP grant (Fundação de Amparo á Pesquisa do Estado de São Paulo), Brazil.
- 2015 - 2018 *Bolsa CNPq de Produtividade em Pesquisa - PQ 2015, Modalidade/Nível : PQ-2.*
“Shape optimization / control of free boundaries”
Grant for productivity in research from CNPq, Conselho Nacional de Desenvolvimento Científico e Tecnológico, (National Council for Scientific and Technological Development, Brazil).
- 03/2012-04/2015 *MATHEON-Project C37*
“Shape / Topology optimization methods for inverse problems”
DFG Research Center MATHEON “Mathematics for key technologies”.

6 Teaching

6.1 Student supervision

06/2018 (in progress)	Yuri Flores Albuquerque PhD student, Instituto de Matemática e Estatística, University of São Paulo.
02/2018 (in progress)	Diego Ruge Master student, Instituto de Matemática e Estatística, University of São Paulo.
09/2016 (in progress)	Jadevilson Cruz Ribeiro PhD student, Instituto de Matemática e Estatística, University of São Paulo.
09/2016 (in progress)	Vanessa Soares Borges da Silva Master student, Instituto de Matemática e Estatística, University of São Paulo.
2014 - 2015	Houcine Meftahi. Postdoctoral researcher in the MATHEON-Project C37 "Shape / Topology optimization methods for inverse problems". Technical University of Berlin, DFG Research Center Matheon.
2014 (concluded)	Philipp Kliewe <i>Analysis, Numerik und Formoptimierung von gekoppelten Fluid-Struktur-Problemen.</i> Master Thesis, Technical University of Berlin.
2013 (concluded)	Dominik Beinert. <i>Formoptimierungsmethoden für Bernoulli-Freirandprobleme.</i> Graduation Thesis, Technical University of Berlin.

6.2 Lectures

2018 (WS)	- <i>Fundamentos de Análise Numérica</i> 1 semester - graduation - teaching in Portuguese Instituto de Matemática e Estatística, Universidade de São Paulo
2018 (SS)	- <i>Introdução á Análise Numérica</i> 1 semester - graduation - teaching in Portuguese Escola Politécnica, Universidade de São Paulo
2017 (WS)	- <i>Resolução Numérica de Equações Diferenciais Parciais Elípticas</i> 1 semester - post-graduation - teaching in Portuguese Instituto de Matemática e Estatística, Universidade de São Paulo
2017 (SS)	- <i>Introdução á Análise Numérica</i> 1 semester - graduation - teaching in Portuguese Escola Politécnica, Universidade de São Paulo
2016 (WS)	- <i>Cálculo diferencial</i> 1 semester - graduation - teaching in Portuguese Instituto de Matemática e Estatística da Universidade de São Paulo
2016 (SS)	- <i>Métodos Numéricos em Equações Diferenciais I</i> 1 semester - graduation - teaching in Portuguese Instituto de Matemática e Estatística da Universidade de São Paulo
2016 (SS)	- <i>Introdução á Análise Numérica</i> 1 semester - post-graduation - teaching in Portuguese Instituto de Matemática e Estatística da Universidade de São Paulo
2015 (WS)	- <i>Shape optimization</i> 1 semester - post-graduation - teaching in English

2014 -2015 (WS)	Instituto de Matemática e Estatística da Universidade de São Paulo - <i>Numerik I für Ingenieure (Numerical analysis for Engineering - 1st year)</i> recitations - graduation - teaching in German Technical University of Berlin, Institute of Mathematics, Berlin, Germany
2013 (WS)	- <i>Nonlinear optimization (Master)</i> Block course (2 weeks) Viện Toán Học, Institute of Mathematics, Hanoi, Vietnam
2012 - 2013 (WS)	- <i>Students seminar (Bachelor)</i> Technical University of Berlin, Germany
2012 - 2013 (WS)	- <i>Inverse problems (Master)</i> 1 semester - post-graduation - teaching in English Technical University of Berlin, Germany
2011-2012	- <i>Optimization with equilibrium constraints (Master)</i> replacements-teaching in English Humboldt University of Berlin, Germany
2011 (SS)	- <i>Computer Mathematics</i> recitations - graduation - teaching in German Humboldt University of Berlin, Germany.
2010-2011	- <i>Nonlinear optimization (Master)</i> replacements - teaching in German Humboldt University of Berlin, Germany.
2010 (SS)	- <i>Mathematics 4</i> 1 semester - post-graduation - teaching in German University of Aachen, Germany.
2010 (SS)	- <i>Mathematics 2</i> 1 semester - graduation - teaching in German University of Aachen, Germany.
2009-2010 (WS)	- <i>Shape and topology sensitivity analysis (Master and Ph.D)</i> 1 semester - post-graduation - teaching in English University of Graz, Austria.
2003-2006	- <i>Linear Algebra, Analysis (1st year)</i> 64 hours/year - graduation - teaching in French ESSTIN Nancy, France.

7 Scientific visits

06/2017	LNCC Petrópolis Invitation from Dr. Antonio André Novotny Petrópolis, Brazil
02/2017	University Duisburg-Essen Invitation from Prof. Irwin Yousept Essen, Germany
06/2015	CMM Santiago Invitation from Prof. Carlos Conca Santiago, Chile

- 04/2014 **Université Pierre et Marie Curie**
Visiting Professorship (one month)
Paris, France
- 01/2014 **University of Concepción**
Invitation from Pr. Rajesh Mahadevan
Concepción, Chile
- 05/2013 **LNCC Petrópolis**
Invitation from Dr. Antonio André Novotny
Petrópolis, Brazil
- 12/2012 **University of Pau**
Invitation from Pr. Marc Dambrine
Pau, France
- 09/2012 **University of Concepción**
Invitation from Pr. Rajesh Mahadevan
Concepción, Chile
- 07/2011 **ENS Cachan Bretagne**
Invitation from Dr. Yannick Privat
Rennes, France
- 08/2010 **CMM Santiago**
Invitation from Prof. Carlos Conca
Santiago, Chile
- 08/2010 **LNCC Petrópolis**
Invitation from Dr. Antonio André Novotny
Petrópolis, Brazil
- 03/2010 **ENS Cachan Bretagne**
Invitation from Dr. Yannick Privat
Rennes, France
- 02/2010 **University of Avignon**
Invitation from Prof. Samuel Amstutz
Avignon, France
- 03/2009 **Humboldt University of Berlin**
Invitation from Prof. Michael Hintermüller
Berlin, Germany
- 07/2008 **University of Sussex**
Invitation from Prof. Michael Hintermüller
Brighton, England
- 04/2008 **Institute Elie Cartan, University of Nancy**
Invitation from Prof. Jan Sokolowski

Nancy, France

03/2008 **ETH (Eidgenössische Technische Hochschule Zürich)**
Invitation from Prof. Christoph Schwab
Zürich, Switzerland

8 Organization of scientific events

03/2018 **Section S19 "Optimization of differential equations"**
GAMM 2018, Munich, Germany.
Invited co-organizer of the section with Prof. Irwin Yousept.

03/2014 **Young Researchers' Minisymposium "Geometry and Shape Optimization"**
GAMM 2014.
Erlangen, Germany.

08/2012 **Minisymposium "Numerical methods in shape and topology optimization"**
ISMP 2012.
Berlin, Germany.

09/2011 **Minisymposium "Modern applications and techniques of shape optimization"**
IFIP TC 7 Conference 2011.
Berlin, Germany.

07/2009 **Minisymposium "Recent Advances in Shape and Topology Optimization"**
SIAM 2009 Annual meeting.
Denver, Colorado, U.S.A.

09/2008 **Workshop "Advances in Shape and Topology Optimization"¹**
University of Graz, Austria.
Co-organizer of the Workshop with the START Project.

09/2007 **ENUMATH 2007²**
University of Graz, Austria.
Co-organizer of the conference.

10/2005 **International meeting Shape optimization and its applications**
Institute Elie Cartan, University Henri Poincaré Nancy-1, France.
Co-organizer of the meeting.

9 Talks

9.1 Talks in Conferences

- 2018 - *Distributed shape derivative and applications*
 IFIP TC 7 Conference on System Modelling and Optimization,
 Essen, Germany, July 2018.
 - *Shape optimization for an eigenvalue problem with indefinite weight*
 South American Workshop on Integral and Differential Equations,
 São Paulo, Brazil, February 2018.
 - *Controlling the footprint of droplets*
 ICMC Summer Meeting on Differential Equations, São Carlos, Brazil, February 2018.
- 2017 - *Controlling the footprint of droplets*
 ENUMATH 2017, Voss, Norway, September 2017.
 - *Structural Optimization using the Level Set Method*
 31st Colóquio Brasileiro de Matemática, IMPA, Rio de Janeiro, Brazil, August 2017.
- 2016 - *Structural Optimization using the Level Set Method*
 II Congresso Brasileiro de Jovens Pesquisadores em Matemática Pura e Aplicada,
 IMECC/Unicamp, Campinas, Brazil, December 2016.
- 2014 - *Control of free boundaries*
 Workshop on shape and topology optimization with PDE constraints in Celebration to the 65th
 Birthday of Professor Jan Sokolowski, LNCC Petrópolis, Brazil, August 2014.
 - *Shape and Topology Optimization Methods for Inverse Problems*
 SIAM Conference on Imaging Science, Hong Kong Baptist University, May 2014.
 - *Controlling the footprint of droplets*
 Workshop on PDE-Constrained Optimization, RICAM Linz, Austria, March 2014.
- 2013 - *Introduction to the topological derivative in shape optimization*
 Summer school on Evolutionary Solid Bodies, Münster, Germany, September 2013.
 - *A Shape Optimization Method for Magnetic Induction Tomography*
 IFIP TC 7/2013, Klagenfurt, Austria, September 2013
 - *Shape optimization of the ground state for two phase conductors*
 EQUADIFF 2013, Prague, Czech Republic, August 2013.
 - *A Shape Optimization Method for Magnetic Induction Tomography*
 ICCOPT 2013, Lisbon, Portugal, July 2013
- 2012 - *Shape optimization for eigenvalue problems*
 Mini-Workshop : Geometries, Shapes and Topologies in PDE-based Applications,
 MFO Oberwolfach, Germany, November 2012.
 - *A shape and topology optimization method for inverse problems in tomography*
 ISMP 2012, Berlin, Germany, August 2012.
 - *A shape and topology optimization method for the resolution of inverse problems*
 SIAM Conference on Imaging Science, Philadelphia, U.S.A., May 2012.
 - *A semismooth Newton method for a class of semilinear optimal control problems*
 PICOE 2012, Paris, France, April 2012.
- 2011 - *Minimization of the ground state for two phase conductors in low contrast regime*
 JFCO7, Perpignan, France, November 2011.
 - *Minimization of the ground state for two phase conductors in low contrast regime*
 IFIP TC7 2011, Berlin, Germany, September 2011.
 - *Minimization of the ground state for two phase conductors in low contrast regime*
 Workshop p.d.e., optimal design and numerics, Benasque, Spain, August 2011.
 - *A shape and topology optimization method for the resolution of inverse problems*
 AIP 2011, College Station, Texas, U.S.A., May 2011.
 - *Multiphase image segmentation based on shape and topological sensitivity*
 AIP 2011, College Station, Texas, U.S.A., May 2011.

- *Optimal shape design subject to variational inequalities*
SIAM conference on optimization, Darmstadt, Germany, May 2011.
- *A shape and topology optimization method for the resolution of inverse problems*
GAMM 2011, Graz, Austria, April 2011.
- 2010 - *A shape and topology optimization method for the resolution of inverse problems*
Advances in Topological Sensitivity Analysis for Computational Modelling,
LNCC Petrópolis, Brazil, August 2010.
- *A shape and topology optimization method for the resolution of inverse problems*
Workshop on Optimal Control in Image Processing, Heidelberg, Germany, June 2010.
- 2009 - *Higher-order expansions in Electrical Impedance Tomography*
Workshop p.d.e., optimal design and numerics, Benasque, Spain, August 2009.
- *Higher-order expansions in Electrical Impedance Tomography*
AIP 2009, Vienna, Austria, July 2009.
- *Higher-order expansions in Electrical Impedance Tomography*
SIAM annual meeting, Denver, Colorado, U.S.A. , July 2009.
- 2008 - *Optimal shape design subject to variational inequalities*
OPTPDE (Optimization with PDE constraints), Warsaw, Poland, December 2008.
- *Multiphase image segmentation by shape and topological sensitivity*
Jahrestagung der Deutschen Mathematiker-Vereinigung 2008,
Erlangen, Germany, September 2008.
- *Optimal shape design subject to variational inequalities*
SIAM Conference on Optimization, Boston, Massachusetts, U.S.A., March 2008.
- 2007 - *Optimal shape design subject to variational inequalities*
SIAM Conference on Analysis of Partial Differential Equations
Phoenix, Arizona, U.S.A., December 2007
- *Multiphase image segmentation by shape and topological sensitivity*
ÖMG/JSMF conference 2007
Podbanske, Slovakia, September 2007
- *Optimal shape design subject to variational inequalities*
ENUMATH 2007, University of Graz, Austria, September 2007
- *A TOPSHAPE algorithm for the solution of a state-constrained problem*
First joint international meeting between the AMS and the PTM
University of Warsaw, Poland, August 2007
- *Using Self-adjoint Extensions in Shape Optimization*
IFIP 2007, Krakow, Poland, July 2007
- *A TOPSHAPE Algorithm for obstacle problems*
Cinquième journées singulières,
CIRM, Luminy, France, April 2007
- 2006 - *A Level set method in shape optimization for variational inequations*
ISMP 2006, Rio de Janeiro, Brazil, August 2006
- *Numerical methods for shape optimization of variational inequalities*
Oberwolfach Workshop : Applications of Asymptotic Analysis,
Mathematisches Forschungsinstitut Oberwolfach, Germany, June 2006
- *A Level set method in Shape optimization*
Analytical and numerical methods for scientific computing in science and engineering,
French-Japanese seminar, University Henri Poincaré, Nancy, France, Februar 2006
- 2005 - *Self-adjoint extensions and topology optimization*
International meeting Shape optimization and its applications, Nancy, France, October 2005

- *Level set methods for variational inequalities*
22nd IFIP TC7 conference, Torino, Italy, July 2005

9.2 Talks in Seminars

- 2017 - *Shape Optimization and Application to Inverse Problems*
Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, Brazil, May 2017
- *Control of free boundaries*
University of Duisburg-Essen, Essen, Germany
- 2016 - *Shape and Topology Optimization Methods for Inverse Problems*
Universidade Federal de Santa Catarina, Florianópolis, Brazil, November 2015
- 2015 - *Introduction to shape optimization*
IMECC, Campinas, Brazil, October 2015
- *Introduction to shape optimization*
IME-USP, São Paulo, Brazil, August 2015
- 2014 - *Control of free boundaries*
Seminar on PDE-constrained optimization, TU Berlin, Germany, November 2014
- 2013 - *Shape and topology optimization methods for inverse problems*
DTU, Lyngby, Denmark, June 2013
- *Shape optimization for eigenvalue problems*
TU Berlin, Germany, June 2013
- *Shape and topology optimization methods for inverse problems*
LNCC petropolis, Brazil, May 2013.
- 2012 - *Recent advances in shape and topology optimization*
University of Concepción, Chile, September 2012
- *Math meets images*
Mathinside seminar, Urania, Berlin, Germany, March 2012
- 2011 - *Propagating interfaces and level set methods*
"What is?" seminar, Urania, Berlin, Germany, December 2011
- *A shape and topology optimization method for the resolution of inverse problems*
TU Berlin, Germany, November 2011
- *Recent Advances in Shape and Topology Optimization : Theory and Applications*
WIAS, Berlin, Germany, November 2011
- *A shape and topology optimization method for the resolution of inverse problems*
RICAM, Linz, Austria, April 2011
- *On a Bernoulli problem with geometric constraints*
University of Clermont-Ferrand, France, January 2011
- 2010 - *A shape and topology optimization method for the resolution of inverse problems*
University RWTH Aachen, Germany, June 2010
- *A shape and topology optimization method for the resolution of inverse problems*
University of Rennes, France, March 2010
- *A shape and topology optimization method for the resolution of inverse problems*

- University of Avignon, France, Februar 2010
- 2009 - *Image reconstruction in Cartesian parallel MRI*
SFB status seminar, Admont, Austria, November 2009.
- *Recent advances in shape optimization*
University of Besançon, France, April 2009.
- 2008 - *Multiphase image segmentation and modulation recovery in MRI*
SFB status seminar, Admont, Austria, November 2008.
- *Electrical Impedance Tomography : From Topology to Shape*
Institute Elie Cartan, University of Nancy, France, April 2008
- *Avancées récentes en Optimisation de Formes*
University of Limoges, France, March 2008
- *Recent Advances in Shape and Topology Optimization*
ETH (Eidgenössische Technische Hochschule Zürich),
Zürich, Switzerland, March 2008
- 2006 - *A Level set method in shape optimization for variational inequations*
Institute of Applied Mathematics ,
University of Erlangen, Germany, April 2006
- *Une méthode "levelset" en optimisation de formes pour des inéquations variationnelles*
LAMA, University of Savoie, Chambéry, France, April 2006
- 2005 - *Structure des dérivées de forme dans des domaines non-réguliers et applications*
ENS Cachan, Antenne de Bretagne,
Campus de Ker-Lann, Bruz, France, March 2005

10 Reviews

More than 50 reviews for the following journals :

Applied Mathematical Modelling.
Applied Mathematics and Computation.
Communications in Nonlinear Science and Numerical Simulation (CNSNS).
Computational Optimization and Applications (COAP).
Computational and Applied Mathematics (COAM).
Computer Methods in Applied Mechanics and Engineering (CMAME)
ESAIM : Control, Optimisation and Calculus of Variations (ESAIM : COCV)
ESAIM : Mathematical Modelling and Numerical Analysis (ESAIM : M2AN)
Inverse Problems.
Journal of Applied Mathematics and Computing.
Journal of Differential Equations.
Journal of Elliptic and Parabolic Equations.
Mathematical Methods in the Applied Sciences.
Nonlinear Analysis : Real World Applications.
Optimization Methods and Software (OMS).
Proceedings in Applied Mathematics and Mechanics (PAMM).
SIAM Journal on Scientific Computing (SISC).
SIAM Journal on Control and Optimization (SICON).

SIAM Journal on Mathematical Analysis (SIMA).
SIAM Journal on Numerical Analysis (SINUM).
Structural and Multidisciplinary Optimization (SAMO).

11 Professional Activities

12-15/12/2016 Banca examinadora do concurso público para provimento do cargo de professor adjunto.
(Examiner of the public competition to fill the position of assistant professor)
UNIFESP (Universidade Federal de São Paulo), Brazil.

12 Miscellaneous

Languages French (native), English (fluent), German (advanced), Portuguese (fluent).
IT skills Matlab, Python, FEniCS, HTML, CSS.

1. <http://math.uni-graz.at/start-workshop08/>
2. <http://www.uni-graz.at/enumath07/>