

Antoine ROUSSEAU (Inria)

Personal data

Antoine Rousseau, born: 20.11.1978 in Cherbourg (France), living in Aubais (France).

Married, one child (born 02.2010). Email: Antoine.Rousseau@inria.fr

Web-page: <http://team.inria.fr/lemon/antoine>

Degrees

2015: Habilitation à Diriger les Recherches (HDR) in mathematics, University of Montpellier, *Mathematical and numerical modeling in environmental sciences* (defended Dec 3rd, 2015).

2005: PhD in mathematics, University of Paris Sud Orsay, *Theoretical and numerical studies of the primitive equations of the ocean without viscosity* (defended June 14th, 2005).

Advisor: Roger Temam (Univ. Paris Sud, French Academy of Sciences & Indiana University).

2002: Master of Science in mathematics, University of Paris Sud.

2001: Agrégation externe de Mathématiques¹, with rank 67.

Employment

2008-present: Experienced research scientist (*chargé de recherche CR1*) at Inria

2006-2008: Junior research scientist (*chargé de recherche CR2*) at Inria

2005-2006: Post-doctoral fellowship at Inria Sophia-Antipolis, team OMEGA

2002-2005: Research & teaching assistant, University of Paris Sud Orsay

Overseas positions as research associate

2016: 9 months in Fundación Inria Chile, Santiago,

2013-2015: several visits (1.5 months in total) at Inria Chile and University of Chile, Santiago,

2010: 2 weeks visit in Los Angeles, California (James C. McWilliams, head of ROMS team, UCLA),

2009: 1 month visit in Bloomington, Indiana (Roger Temam, head of Institute for Scientific Computing, Indiana University)),

2005: 1 month visit in Boulder, Colorado (Joseph Tribbia, head of *Climate Dynamics and Predictability* dept at NCAR),

2002-2005: 9 months in Bloomington, Indiana (PhD advised by Roger Temam).

Teaching

2016: Lectures for PhD students and researchers, *Domain decomposition methods*, Pontificad Universidad Católica, Santiago, Chile. 4h

2014: Lectures for PhD students and researchers, *Large scale ocean models beyond the traditional approximation*, University of Toulouse. 6h

2011-2013: Lectures for PhD students and researchers, *Domain decomposition methods*, University of Montpellier. 20h/year

2008-2010: Lecturer in M.Sc. level, *PDEs and scientific computing*, University of Grenoble. 30h/year

2009: Guest Lecturer of M.Sc., *Boundary layers in geophysical fluid dynamics*, University of Kourou (french Guyana). 12h

¹High-level national competitive examination for the recruitment of teachers in France. Ranked 67 out of 1200 candidates.

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PhD, Post-Doc and Engineer Advising

2013-2016: MP. Daou. PhD: *Coupling multi-dimensionnal coastal oceanography models*. Advising: 50%. Co-advisor: E. Blayo. Defended Sept. 2016.

2010-2013: M. Tayachi-Pigeonnat. PhD: *Theoretical and numerical studies of coupled models in hydrology and oceanography*. Advising: 50%. Co-advisor: E. Blayo. Defended Dec. 2013.

2008-2012: D. Cherrel. PhD: *Domain decomposition methods in mathematical oceanography*. Advising: 50%. Co-advisor: E. Blayo. Defended Dec. 2012.

2016: C. Acary-Robert. Research Engineer: *Numerical modeling of the Chilean coast using ROMS*. Advising: 100%.

2012-2015 : C. Paris. Post-doc at Inria Chile: *Mathematical Modeling for SDM*. Advising: 40%. Co-advisor: M. Bossy.

2013-2015 : S. Kraria. Dev. Engineer: *Graphic User Interface for SDM*. Advising: 10%. Co-advisor: M. Bossy.

2011-2015 : J. Morice. Post-doc at Inria Chile: *Numerical modeling for SDM*. Advising: 40%. Co-advisor: M. Bossy.

2008-2010 : C. Chauvin. Post-doc at Inria: Hybrid stochastic-deterministic modelling. Advising: 40%. Co-advisor: M. Bossy.

A. Rousseau has also advised or co-advised 15 master thesis students both in France and Chile. Some of them started a PhD, the others work in scientific companies (*Comsol Multiphysics*) or teach mathematics in high school.

Committees and responsibilities

2014-present: Scientific leader of the Inria research team LEMON: <http://team.inria.fr/lemon>

2017: In charge of the workgroup "Environmental modeling" for Inria Strategic Plan

2013-present: In charge of the development of SELECT, an Inria software to manage scientific recruitments online

2016: HdR board of Carine Lucas. Université d'Orléans.

2016: PhD board (+ reviewer) of Souad Khiari. Université Technologique de Compiègne.

2016: PhD board of Victor Riquelme. Universidad de Chile, Santiago.

2015: PhD board of Jérôme Luquel. Université de Pau et des Pays de l'Adour.

2015: Co-Chair of the Cemracs'15 in Marseilles.

2013: PhD board of Vincent Visseq. Université Montpellier 2.

2012-present: Member of the **editorial board of DCDS-S**.

2011-2014: Member of the **Inria national evaluation board**.

2009-2011: Member of the *Agrégation Externe de Mathématiques* committee.

2007 & 2009: Member of the organizing committees of *SMAI* conferences (>300 participants)

Scientific Outreach

2017: Co-author (with Marcela Szopos) of "Calendrier Mathématique 2017" tinyurl.com/hpubsgo

2017: Presentation of TsunamiLab at Bienal de Diseño, Santiago, Chile. bienaldediseno.cl

2016-present: Member of the scientific board of Fondation Blaise Pascal

2015: Inria representative to COP21 (Paris).

Public lectures for officials (including PR François Hollande)

2013: Member of the **national executive board** for the large scale initiative "Mathematics of the Planet Earth 2013". Administrator of breves-de-maths.fr

2012-present: Member of the national scientific outreach committee at Inria.

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Funding ID

2017-present: New Modeling tools for coastal oceanography (NEMOLOCO). Équipe associée funded by Inria (10k/year). Co-PI: A.Rousseau & Rodrigo Cienfuegos (PUC Santiago).

2015-present: Marine Energy Research and Innovation Center (MERIC). Funding by CORFO (Chile). Global amount: 22M\$. A.R. is responsible for work package *Mathematical and numerical modeling for energy resource assessment in Chile*, corresponding to 6 man-years.

2013: CNRS Funding, *COCOA*, *COupling Coastal, Ocean and Atmosphere models*.

PI.: A. Rousseau. Funding: 20k€.

2012-present: LABEX² Funding, *NUMEV*, *Coupling fluids and life sciences*.

PI.: A. Rousseau. Funding: 5k€/year.

2010-2013: Inria-EDF (french national Electricity company) partnership, *Coupling methods for the simulation of river flows*. PI: A. Rousseau. Global funding: 200k€.

2004-2010: Inria-ADEME partnership, *Stochastic methods for downscaling, application to weather forecasting*. Co-PI: M. Bossy (60%) & A. Rousseau (40%). Global funding: 300k€.

Publications

A. Rousseau is the author of more than 22 published papers in peer reviewed journals, 7 proceedings in international conferences, 1 book chapter and 1 patent. See complete list on <http://team.inria.fr/lemon/antoine>.

Journal papers (selected)

- [1] M. Bossy, J. Espina, J. Morice, C. Paris and A. Rousseau Modeling the wind circulation around mills with a Lagrangian stochastic approach. *SMAI-JCM*, to appear, 2016. hal-01088927.
- [2] C. Lucas, J.C. McWilliams and A. Rousseau On nontraditional quasi-geostrophic equations. *ESAIM: M2AN*, to appear, 2016. hal-01232740
- [3] S. Barbier, A. Rapaport and A. Rousseau Modelling of biological decontamination of a water resource in natural environment and related feedback strategies. *Journal of Scientific Computing* pp 1–14, 2016.
- [4] E. Blayo, D. Cherel and A. Rousseau Towards optimized Schwarz methods for the Navier-Stokes equations. *Journal of Scientific Computing*, 66(1):275–295, 2015.
- [5] E. Frénod and A. Rousseau Paralic Confinement - models and simulations. *Act. Appl. Math.*, DOI: 10.1007/s10440-012-9706-2, 2012.
- [6] C. Lucas, M. Petcu and A. Rousseau. Quasi-hydrostatic primitive equations for ocean global circulation models. *Chin. Ann. Math.*, 31B(6):1–20, 2010.
- [7] F. Bernardin, M. Bossy, C. Chauvin, J.F. Jabir and A. Rousseau. Stochastic lagrangian method for downscaling problems in computational fluid dynamics. *Mathematical Modelling and Numerical Analysis*, 44:885–920, 2010.
- [8] C. Lucas and A. Rousseau. New developments and cosine effect in the viscous shallow water and quasi-geostrophic equations. *SIAM Multiscale modeling and Simulations*, 7(2):793–813, 2008.

²LABEX means *Laboratoire d'Excellence*, it is a national funding dedicated to the most excellent labs in the country.

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- [9] A. Rousseau, R. Temam and J. Tribbia. The 3d primitive equations in the absence of viscosity: boundary conditions and well-posedness in the linearized case. *J. Math. Pures Appl. (9)*, 89:217–319, 2008.
- [10] Q. Chen, J. Laminie, A. Rousseau, R. Temam and J. Tribbia. A 2.5 D model for the equations of the ocean and the atmosphere. *Analysis and Applications*, 5(3):199–229, 2007.

Book chapter

- [B1] A. Rousseau, R. Temam and J. Tribbia. Boundary value problems for the inviscid primitive equations in limited domains. In P. G. Ciarlet, editor, *Handbook of Numerical Analysis, Special volume on Computational Methods for the Oceans and the Atmosphere*, volume XIV, chapter 11, pages 481–575. Elsevier, Amsterdam, 2008.

Patent

- [P1] A. Rapaport, A. Rousseau, J. Harmand. Procédé de traitement d’une ressource fluide, programme d’ordinateur et module de traitement associés. FA 78 4546 - FR 13 55129. 2014.

Invitations in international conferences

- 2016: Franco-chilean conference on bioprocess modeling. Santiago, Chile.
- 2016: *AIMS Int. Conf.*, Orlando, FL, USA. Special Session by R. Temam.
- 2015: NUMACH conference, Xiamen, PR of China.
- 2014: Franco-chilean optimisation conference. Valparaiso, Chile.
- 2012: *AIMS Int. Conf.*, Orlando, FL, USA. Special Sessions by E. Frénod and S. Wang.
- 2010: *International Conference on Applied Analysis*, Fudan University, Shanghai, China.
- 2010: *Advances in PDEs and their Applications*, Donghua University, Shanghai, China.
- 2006: *Mathematical and Geophysical Fluid Dynamics: Analytical and Stochastic Methods*, American Institute of Mathematics, Palo Alto, CA, USA.

Softwares

Stochastic Downscaling Method (SDM). See <https://windpos.inria.fr>

Other main contributors: M. Bossy, S. Kraria (Inria), J. Morice, C. Paris (Inria Chile).

Personal contribution: 25%.

SDM is a software made to compute wind at small scales and simulate interactions between flow and windmills. It relies on a specific modeling of the turbulence closure, and involves various simulation techniques whose combination is totally new (such as Poisson solvers, optimal transport algorithms, original Euler scheme for confined Langevin stochastic processes, and stochastic particle methods).

TsunamiLab. See <https://tsunamilab.inria.fr>

Main contributor: José Galaz.

Personal contribution: 10% (student advising).

Tsunami-Lab is an educational platform enabling simulation and visualization of tsunami effects in real time, with several historical scenarios and the possibility to build your own one. The target of this project is to provide students as well as general audience with an educational tool, intended to reduce tsunamis impact in Chile and help sparing human lives.