

Madalina Deaconu

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Research area

Stochastic analysis and modelling, Probabilistic numerical methods, Rupture phenomena: detection and simulation, Spatio-temporal stochastic models and data analysis.

Ongoing position and responsibilities

- 1998- Research scientist at Inria Nancy - Grand Est
- 2018- Head of the Fédération Charles Hermite (Research Federation) of the Lorraine University and CNRS
- 2019- Leader of the Inria Tosca-NGE-Post research team in Nancy, since January 2019
- 2019- Member of the Bureau du Comité des Projets (Decisional sub-group of research teams leaders), Inria - Nancy

Education

- 2008 Habilitation à diriger des recherches (HDR), Henri Poincaré University, Nancy
- 1997 PhD in Applied Mathematics, Henri Poincaré University, Nancy
- 1994 Master 2 Degree (First Class) in Applied Mathematics, Henri Poincaré University, Nancy
- 1993 BSc (First Class) in Mathematics, University of Craiova, Romania

Main responsibilities

- Head of the Fédération Charles Hermite in Nancy, since January 2018.
- Leader of the Research Team Tosca-NGE-Post, since January 2019.
- Member of *Bureau du Comité des Projets* of the Inria Nancy - Grand Est. My specific mission concerns the *interaction between applied mathematics and computer science*, since 2011. Renewed in January 2019.
- Deputy Leader of the Research Team Tosca in Nancy, 2005-2018.
- Member of the *Bureau and the Conseil of the Pôle Automatique, Mathématiques, Informatique et leurs Interactions (AM2I) of the Lorraine University*, since January 2018.
- Member of the *Conseil du Laboratoire de l'Institut Élie Cartan de Lorraine*, since January 2018.
- Member of *Jury d'admissibilité Chargée de Recherche* of Inria Nancy - Grand Est, 2002-2009, 2014 and 2016-2019.
- Member of *Comité des Projets* of the Inria Nancy - Grand Est, since 2005.
- Member of *Groupe de Travail Actions Incitatives* of Cost Inria, 2011–2013.
- Member of *Groupe de Travail Accueil des chercheurs* of the Inria Nancy - Grand Est, 2013–2014.
- Member of *Conseil de Laboratoire* of the Élie Cartan Institute in Nancy, 2001-2010.
- Member of *Groupe de Travail Relations Internationales du COST* of Inria, 2004-2007.
- Member of the *Commission des Développements Technologiques* of the Inria Nancy - Grand Est, 2009-2012.
- Member of the *Commission locale pour les Postes d'accueils* of Inria Lorraine, 2001-2006.

Management of research projects with industrial partnerships (since 2010)

- Foyer (Main Luxembourg Insurance), University of Luxembourg and Tosca-NGE-Post research team (2018-2022). Research on the recommendation systems in insurance framework. I am supervising, with R. State (University of Luxembourg) the PhD thesis of L. Lesage. I am the coordinator of this project for the Tosca-NGE-Post research team.
- Société Générale (Paris) and CRAN/IECL (Lorraine University) (2019-2023) on the data analysis of financial data.
- SME Venathec (Nancy) and Tosca and Multispeech teams from Inria Nancy (2014-2018). Research on the acoustic control of wind farms. I supervised, with E. Vincent, the PhD thesis of B. Dumortier on this topic.
- SME Alphability and Tosca team in Nancy (2012-2016). Research on risk measures and rare events in finance. I was the coordinator of this project.

- Gaz de France/Electrabel (2010-2011). Collaboration between Tosca team in Nancy and the team R&D Economic studies, Prices and Markets Modelling and Advanced Studies of Gaz de France/Electrabel, on the hedging of the production for a power plant. I was one of the coordinators of this project.
- Gaz de France (2010) and the Tosca team in Nancy and Gaz de France, on Monte Carlo methods for predicting failures of gas pipes. I was one of the coordinators of this project.

Conferences organized (main)

- Invited minisymposium *Stochastic analysis*, co-organized with M. Arnaudon (University of Bordeaux) and I. Câmpăian (IMAR Bucharest), in the 14e Colloque Franco-Roumain de mathématiques appliquées, 27-31 August 2018, Bordeaux.
- Special session *First passage times of diffusions*, co-organized with S. Herrmann (University of Dijon), Conference Stochastic Processes and Applications, 11-15 June 2018, Gothenburg, Sweden.
- Minisymposium at CANUM 2016, on *A panorama of recent progress in probabilistic numerical methods*, 9–13 May 2016, Obernai.
- Workshop *Avalanches and rupture phenomena*, 3-4 February 2015, Nancy.
<http://iecl.univ-lorraine.fr/~Madalina.Deaconu/workshop2015>
- Workshop *Hitting times and exit problems in stochastic models*, 27–29 November 2013, Dijon, (with S. Herrmann).
<http://herrmann.perso.math.cnrs.fr/hitting-exit-2013.htm>
- Organization (with G. Pagès), of a special session at XI^{ème} Colloque Franco-Roumain de Mathématiques Appliquées, on *Numerical probabilities*, 24-30 August 2012, Bucharest.
- Workshop *Incertitudes et systèmes d'évolution*, 6 May 2009, Institute Henri Poincaré, Paris.
- Invited session at CANUM 2008, on *Hybrid methods*, 26-30 May 2008, Saint Jean de Monts.
- Co-responsible with A. Lejay, of the Organizing Committee of *Journées du Groupe MAS (Modélisation Aléatoire et Statistique)* of SMAI, 6-8 September 2004, Nancy.
- International conference MC2QMC 2004, 7-10 June 2004, Juan-les-Pins.
- International conference Monte Carlo 2000, 3-5 July 2000, Monaco.

Students supervision

- Postdoctoral fellowship of Oana Lupaşcu (2014-2015), Inria funding.
- Postdoctoral fellowship of Samih Zein (2008-2009), Inria funding.
- PhD of Laurent Lesage, with R. State (University of Luxembourg), started 2018.
- PhD of Baldwin Dumortier, with E. Vincent (Inria Nancy), on acoustic control of wind farms (2014-2018).
- PhD of Khaled Salhi, with A. Lejay (Inria Nancy), on risk measures and portfolio optimization (2013-2016).
- PhD of Paul Charton (2010-) on the prices fixation on renewable energies markets.
- PhD of Numa Lescot (25%, 2009-2012) in a collaboration with Natixis
- PhD of Sébastien Chaumont (25%, 1999-2002), on stochastic control problems
- Supervision of 4 Master 2 Research internships.
- Supervision of 16 internships from École Polytechnique in Paris, École Polytechnique of Tunisia and École des Mines in Nancy. The subjects are mainly in mathematical finance, stochastic calculus and Monte Carlo methods.
- Supervision of 12 scientific internships at Master 1 and Master 2 levels.

Expertise

- Reviewer for international reviews: Stochastic Processes and Applications, The Annals of Applied Probability, Journal of Computational Physics, Physica D, SIAM Journal on Numerical Analysis (SINUM), SIAM Journal on Scientific Computing (SISC), Journal of Statistical Physics, Potential Analysis, Statistics and Computing, Mathematics and Computers in Simulation, etc.
- Expert for *The Executive Agency for Higher Education, Research, Development and Innovation Funding*, Romania.
- Editorial and scientific committee of the Proceedings CFR 2012 (XI^{ème} Colloque Franco-Roumain de Mathématiques Appliquées, 2012).
- Comité Scientifique du 2^{ème} Congrès National de Mathématiques Appliquées et Industrielles, SMAI 2005.
- Permanent reviewer for *Mathematical Reviews*.
- Member of MAS Group in SMAI.

- Member of the *Commission de spécialistes 25/26* of the University Henri Poincaré, 2001-2008.
- Member of the *Comité de sélection*, position Assistant professor Section 26, Lorraine University, 2012, Dijon University, 2015, Bordeaux University, 2015.

Conferences and visits abroad

- Invited lectures: 3 (Chile, Romania)
- Conferences: 30
- Invited visits abroad: Lawrence Berkley National Laboratory USA, Indiana University USA, Institute of Mathematics of the Romanian Academy (9), Politecnico de Milano Italy, EPFL Switzerland, University of Concepcion Chile

Invited lecture (recent)

- *Stochastic methods and numerical aspects for fragmentation and coagulation processes* (10h), Summer School of Applied Mathematics, 1-9 July 2019, Sinaia.

Main conferences and seminars (invited speaker)

- Stochastic analysis and related topics, 6-9 May 2019, Centre Francophone in Mathematics of Bucarest and IMAR Bucarest. <https://sites.google.com/site/analysestochastique/>
- Workshop in Stochastics and PDEs, 14-15 September 2018, IMAR Bucharest. <http://www.imar.ro/~imar/2018/Conferinte/Afis-EDP.pdf>
- The 21h Conference of the Romanian Society of Probability and Statistics, 13-14 avril 2018, The Romanian Society of Probability and Statistics. <http://spsr.csm.ro/spsr2018>
- Plenary speaker at the *Forum de jeunes mathématicien.ne.s*, 22-24 November 2017, Nancy.
- SIAM Conference on Control and its Applications, 10-12 July 2017, Pittsburgh.
- XIII-ième Colloque Franco-Roumain de Mathématiques Appliquées, 24-29 August 2016, Iași, Romania.
- ILAC Luxembourg, 10 mars 2016.
- The Eighth Congress of Romanian Mathematicians, 26 June -1 July 2015, Iași, Roumania.
- Rencontre EDP/Probab, 6 March 2015, Institut Henri Poincaré, Paris.
- Workshop: Modélisation et simulation numérique, 28 November 2014, Nancy.
- Joint International Meeting of the AMS and the Romanian Mathematical Society, 27-30 June 2013, Alba Iulia, Romania.
- Workshop Sequential Monte Carlo methods and Efficient simulation in Finance, École Polytechnique, 10 October 2012, Paris.
- École Polytechnique Fédérale de Lausanne, 11 July 2012, Lausanne.
- Simion Stoilow Institute of Mathematics of the Romanian Academy, 13-14 December 2011, Bucharest.
- International Conference on Stochastic Analysis and Applications, 10-14 October 2011, Hammamet.
- The Seventh Congress of Romanian Mathematicians, 9 June - 5 July 2011, Braşov, Romania.
- PDE/Applied Math Seminar, Indiana University, 19 November 2010, Bloomington.
- ICIAM 2007, 16-20 July 2007, Zurich.
- Congrès SMAI 2007, 4-7 June 2007, Praz sur Arly.
- Workshop *First workshop on Renewable energy, energy efficiency and stochastic modelling*, Universidad de Concepción, 3-5 July 2007, Concepción, Chili.
- Workshop *Stochastic Approach for the Smoluchowski coagulation equation via nonlinear processes*, Isaac Newton Institute for Mathematical Sciences, 7-13 December 2003, Cambridge.
- Workshop *Stochastic Models for Coagulation Processes*, MFO (Mathematisches Forschungsinstitut Oberwolfach), 19-25 August 2001, Oberwolfach.
- Workshop *Stochastic Numerics Conference*, ETH, 19-21 February 2001, Zurich.

Recent teaching activities (recent)

- Lectures on *SDE: numerical approach* in Master 2 at the École des Mines in Nancy (2015-2017).

- Lectures on *Random variables simulation* at École des Mines in Nancy (2011-2016 and 2017-2019).
- Lectures on *Stochastic Modelling* on Master 2 of Mathematics IMSD, Lorraine University, (2009-2019).
- Lectures on *Monte Carlo Simulation* at Faculté de Gestion et Économie, Nancy (2013-2019).

Publications

- The complete list of my publications is available on <http://www.iecl.univ-lorraine.fr/~Madalina.Deaconu>

Papers

- [1] L. Beznea, M. Deaconu and O. Lupaşcu, *Numerical approach for stochastic differential equations of fragmentation; application to avalanches*, Mathematics and Computers in Simulation. Accepted for publication, 2018. Available online.
- [2] M. Deaconu and S. Herrmann, *Initial-boundary value problem for the heat equation - A stochastic algorithm*, The Annals of Applied Probability **28:3** (2018), 1943-1976, HAL <https://hal.inria.fr/hal-01380365v1>.
- [3] M. Deaconu, A. Lejay and K. Salhi, *CVaR minimization for hedging under exponential-Lévy models*, Journal of Computational and Applied Mathematics **326** (2017), 171-182, HAL <https://hal.archives-ouvertes.fr/hal-00933198>.
- [4] M. Deaconu and S. Herrmann, *Simulation of hitting times for Bessel processes with non integer dimension*, Bernoulli **23** (2017), 3744-3771, HAL <https://hal.archives-ouvertes.fr/hal-00933198>.
- [5] M. Deaconu, S. Herrmann and S. Maire, *The walk on moving spheres: a new tool for simulating Brownian motion's exit time from a domain*, Mathematics and Computers in Simulation **135** (2017), 28-38, HAL <https://hal.archives-ouvertes.fr/hal-00931816>.
- [6] K. Salhi, M. Deaconu, A. Lejay, N. Champagnat and N. Navet, *Regime switching model for financial data: Empirical risk analysis*, Physica A **461** (2016), 148-157, HAL <https://hal.inria.fr/hal-01095299>.
- [7] L. Beznea, M. Deaconu and O. Lupaşcu, *Stochastic equation of fragmentation and branching processes related to avalanches*, Journal of Statistical Physics **162** (2016), 824-841, HAL <https://hal.inria.fr/hal-01216137>.
- [8] L. Beznea, M. Deaconu and O. Lupaşcu, *Branching processes for the fragmentation equation*, Stochastic Processes and their Applications **125** (2015), 1861-1885, doi 10.1016/j.spa.2014.11.016, HAL <https://hal.inria.fr/hal-00948876>.
- [9] M. Deaconu and S. Herrmann, *Hitting time for Bessel processes—walk on moving spheres algorithm (WoMS)*, The Annals of Applied Probability **23:6** (2013), 2259–2289.
- [10] S. Zein, A. Lejay and M. Deaconu, *An efficient algorithm to simulate a Brownian motion over irregular domains*, Communications in Computational Physics **8:4** (2010), 901–916, HAL [inria-00444056](https://hal.inria.fr/hal-00444056).
- [11] M. Deaconu and A. Lejay, *Simulation of diffusions by means of importance sampling paradigm*, The Annals of Applied Probability **20:4** (2010), 1389–1424, HAL [inria-00126339](https://hal.inria.fr/hal-00126339).
- [12] M. Deaconu and A. Lejay, *A random walk on rectangles algorithms*, Methodology and Computing in Applied Probability **8:1** (2006), 135–151, HAL [inria-00092424](https://hal.inria.fr/hal-00092424).
- [13] M. Deaconu, N. Fournier and E. Tanré, *Rate of Convergence of a Stochastic Particle System for the Smoluchowski coagulation equation*, Methodology and Computing in Applied Probability **5:5** (2003), 131–158.
- [14] M. Deaconu and N. Fournier, *Probabilistic approach of some discrete and continuous coagulation equations with diffusion*, Stochastic Processes and Their Applications **101** (2002), 83–111.
- [15] M. Deaconu, N. Fournier and E. Tanré, *A pure jump Markov process associated with the Smoluchowski's coagulation equation*, The Annals of Probability **30:4** (2002), 1763–1796.
- [16] M. Deaconu and E. Tanré, *A generalization of the connection between the additive and multiplicative solutions for the Smoluchowski's coagulation equation*, Monte Carlo Methods and Applications **7:1-2** (2001), 141–147.
- [17] M. Deaconu and E. Tanré, *Smoluchowski's coagulation equation: probabilistic interpretation of solutions for constant, additive and multiplicative kernels*, Annali della Scuola Normale Superiore di Pisa, Série IV **XXIX:3** (2000), 549–580.

- [18] M. Deaconu, M. Gradinaru and J.R. Roche, *Sojourn time of some reflected Brownian motion in the unit disk*, Probability and Mathematical Statistics **20**:1 (2000), 19–38.
- [19] M. Deaconu and S. Wantz, *Processus non linéaire auto-stabilisant réfléchi*, Bulletin des Sciences Mathématiques **122** (1998), 521–569.
- [20] M. Deaconu and S. Wantz, *Comportement des temps d'atteinte d'une diffusion fortement rentrante*, Séminaire de Probabilités XXXI. Éditeurs: J. Azéma, M. Emery, M. Yor. Lecture Notes in Mathematics **1655** (1997), 168–175.
- [21] M. Deaconu, *Régularité du mouvement brownien itéré*, C.R. Acad. Sci. Paris **323, Série I** (1996), 933–938.
- [22] M. Deaconu and S. Wantz, *Comportement des temps d'atteinte d'une diffusion fortement rentrante*, C.R. Acad. Sci. Paris **322, Série I** (1996), 757–762.

Proceedings

- [23] B. Dumortier, E. Vincent and M. Deaconu, *Recursive Bayesian estimation of the acoustic noise emitted by wind farms*, 2017 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2017.
- [24] B. Dumortier, E. Vincent and M. Deaconu, *Acoustic Control of Wind Farms*, EWEA 2015 - European Wind Energy Association, Poster award, 2015, HAL <https://hal.archives-ouvertes.fr/hal-01233730v1>.
- [25] M. Deaconu and A. Lejay, *Simulation of exit times and positions for Brownian motions and Diffusions*, Sixth International Congress on Industrial Applied Mathematics (ICIAM07) and GAMM Annual Meeting, Zurich 2007, PAMM 7:1 (2008), 1081401–1081402, HAL inria-00348693.
- [26] M. Deaconu, N. Fournier and E. Tanré, *A pure jump Markov process associated with the Smoluchowski's coagulation equation*, Stochastic Numerics 2001, a Workshop on numerical methods for stochastic differential equations, Feynman-Kac representations and paths integrals, Zurich (2001).

Submitted papers

- [27] B. Dumortier, E. Vincent and M. Deaconu, *Efficient optimisation of wind power under acoustic constraints* (2018), HAL <https://hal.archives-ouvertes.fr/hal-01233730v1>. Soumis.
- [28] R. S. Stoica, M. Deaconu, A. Philippe and L. Hurtado, *Simulated annealing through ABC Shadow dynamics* (2019).

Working papers

- [29] M. Deaconu and S. Herrmann, *New methods for the simulation of the hitting times for general PDEs* (2018).
- [30] L. Beznea, M. Deaconu and O. Lupaşcu, *Branching processes for some equations in fluid dynamics* (2018).

Reports of industrial collaborations

- [31] N. Champagnat, M. Chikhaoui, M. Deaconu and A. Lejay, *Gestion de risque de portefeuille : estimation de la VaR et la CVaR*, 2016. Rapport de contrat Alphability - EPC Tosca Nancy.
- [32] N. Champagnat, M. Deaconu, A. Lejay and A. Bedoui, *Analyse de dépendance d'actifs financiers par la méthode des copules*, 2015. Rapport de contrat Alphability - EPC Tosca Nancy.
- [33] N. Champagnat, M. Deaconu, A. Lejay and K. Salhi, *Mesure de risque : détection du régime de crise et calcul de la Value-at-Risk*, 2013. Rapport de contrat Alphability - EPC Tosca Nancy.
- [34] S. Boukherouaa, N. Champagnat, M. Deaconu and A. Lejay, *Mesure de risques : calcul de la Value-at-Risk et application à la gestion de portefeuilles*, 2013. Rapport de contrat Alphability - EPC Tosca Nancy.
- [35] M. Deaconu, S. Herrmann and A. Lejay, *Sur le problème de la stratégie optimale de couverture d'une centrale électrique*, 2011. Rapport de contrat GDF Suez Louvain la Neuve - EPC Tosca Nancy.
- [36] M. Deaconu and A. Lejay, *Problème d'éclatement de tuyaux : approches Monte Carlo*, 2010. Rapport de contrat GDF Suez - La Plaine, Saint Denis - EPC Tosca Nancy.
- [37] A. Bergaoui, M. Deaconu, M. Z. Ghazai, I. Henrichi, S. Herrmann, A. Lejay, V. Reutenauer, D. Talay, E. Tanré and Y. Wang, *Méthodes de réduction de variance originales et de simulation exacte de prix et de grecques en finance*, 2009. Rapport de contrat Calyon - EPC Tosca.

- [38] M. Bossy, M. Deaconu and E. Tanré, *Rapport de fin de collaboration EDF/Inria sur un modèle d'équilibre de production pour la détermination du prix spot*, 2003. Rapport de contrat EDF-Projet Omega.
- [39] M. Deaconu, *Rapport de fin de collaboration EDF/Inria, Étude de la capacité des centrales électriques*, 2000. Rapport de contrat EDF - Projet Omega.
- [40] M. Bossy, M. Deaconu, J.P. Minier and D. Talay, *Rapport de fin de collaboration EDF/Inria sur la simulation d'écoulements diphasiques turbulents*, 1998. Rapport de contrat EDF - Projet Omega.

Habilitation and PhD thesis

- [41] M. Deaconu, *Processus stochastiques associés aux équations d'évolution linéaires ou non-linéaires et méthodes numériques probabilistes*, Habilitation à diriger des recherches, Université Henri Poincaré, Nancy, 2008. Committee members: J. Bertoin (president), P. Del Moral, E. Gobet, S. Méléard, J. Norris, B. Roynette and D. Talay.
- [42] M. Deaconu, *Processus stochastiques et EDP/Applications des espaces de Besov aux processus stochastiques*, Thèse de doctorat, Université Henri Poincaré, Nancy, 1997. Supervisor: B. Roynette. Committee members: D. Bakry, Z. Ciesielski, M. Dozzi, G. Kerkycharian, P. Vallois and M. Yor (president).

DEA and Master thesis

- [43] M. Deaconu, *Sur trois articles de Bernard Roynette : Mouvement brownien et espaces de Besov, Le temps local brownien dans les espaces de Besov et Grandes déviations du temps local brownien*, Mémoire de DEA, Université Henri Poincaré, Nancy, 1994.
- [44] M. Deaconu, *Markov Chains and Coupling Approach in Probability Theory*, Final Year-Project Report 1992/1993, Faculty of Engineering, Science and Mathematics, Middlesex University, Londres, 1993.

Preprints

- [45] M. Deaconu and A. Kamont, *Approximation by Tensor Product Neural Networks*, 1995. Prépublication de l'Institut Élie Cartan, Nr. 20.
- [46] M. Deaconu and B. Roynette, *Besov Regularity for the Solution of Walsh Equation*, 1995. Prépublication de l'Institut Élie Cartan, Nr. 6.