

Curriculum Vitæ

Madalina DEACONU

Tosca team

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Position

- Research scientist (Chargée de recherches 1^{ère} classe) at Research Center Inria Nancy - Grand Est, Tosca team (TO Simulate and CALibrate stochastic processes)
- Deputy leader of the Tosca team in Nancy, since 2005
- Research done in the Tosca team at Inria Nancy and in the Probability and Statistic's team of the Élie Cartan Institute of Lorraine

Education

- May 2008 **Habilitation (HDR)** at University Henri Poincaré, Nancy
Title : *Stochastic processes for linear and nonlinear evolution equations and probabilistic numerical methods*

Committee members: J. Bertoin (president), P. Del Moral, E. Gobet, S. Méléard, J. Norris, B. Roynette and D. Talay
- June 1997 **PH.D. in Applied Mathematics** at University Henri Poincaré, Nancy
Mention “très honorable avec les félicitations du jury”
Title : *Stochastic processes and partial differential equations / Besov spaces' applications to stochastic processes*

Supervisor: Bernard Roynette
Committee members: D. Bakry, Z. Ciesielski, M. Dozzi, G. Kerkyacharian, P. Vallois and M. Yor (president)
- June 1994 Master 2 Degree (DEA) in Applied Mathematics of the University Henri Poincaré, Nancy, (rank 1)
- June 1993 ”Licenta” Degree (Bac + 5 - Master level) in Mathematics at the University of Craiova, Romania, (rank 1, 10/10)

Professional Experience

- Since 1/09/1998, Research scientist (Chargée de recherche 1^{ère} classe, since 2001) at Inria Nancy - Grand Est in the Tosca team
- 1/09/1996 - 31/08/1998 Temporary Assistant, research and teaching position at University Henri Poincaré, Nancy

Publications

Papers

- [1] M. Deaconu and S. Herrmann, *Simulation of hitting times for Bessel processes with non integer dimension* (2016), HAL <https://hal.archives-ouvertes.fr/hal-00933198>. Accepted for publication to Bernoulli.
- [2] 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>.
- [3] 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>.
- [4] 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* (2015), HAL <https://hal.archives-ouvertes.fr/hal-00931816>. Accepted for publication, available on line.
- [5] 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>.
- [6] 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.
- [7] 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).
- [8] 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).
- [9] 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).

- [10] 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.
- [11] 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.
- [12] 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.
- [13] 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.
- [14] 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.
- [15] 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.
- [16] M. Deaconu and S. Wantz, *Processus non linéaire auto-stabilisant réfléchi*, Bulletin des Sciences Mathématiques **122** (1998), 521–569.
- [17] 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.
- [18] M. Deaconu, *Régularité du mouvement brownien itéré*, C.R. Acad. Sci. Paris **323**, Série I (1996), 933–938.
- [19] 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

- [20] B. Dumortier, E. Vincent and M. Deaconu, *Recursive bayesian estimation of the acoustic noise emitted by wind farms*, ICASSP 2017 (2017). Accepted for publication.
- [21] 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>.
- [22] 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](https://hal.inria.fr/inria-00348693).

- [23] 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

- [24] M. Deaconu and S. Herrmann, *Initial-boundary value problem for the heat equation - A stochastic algorithm* (2016), HAL <https://hal.inria.fr/hal-01380365v1>. Submitted.
- [25] L. Beznea, M. Deaconu and O. Lupaşcu, *Numerical approach for stochastic differential equations of fragmentation, application to avalanches* (2017). Submitted.
- [26] M. Deaconu, A. Lejay and K. Salhi, *Approximation of CVaR minimization for hedging under exponential-Lévy models* (2017). Submitted.

Working papers

- [27] S. Boukherouaa, N. Champagnat, M. Deaconu, A. Lejay and N. Navet, *Fat tails and financial data*. Working paper.

Reports of industrial collaborations

- [28] 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.
- [29] 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.
- [30] 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.
- [31] 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.
- [32] 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.
- [33] 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.
- [34] 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.

- [35] 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.
- [36] M. Deaconu, *Rapport de fin de collaboration EDF/Inria, Étude de la capacité des centrales électriques*, 2000. Rapport de contrat EDF - Projet Omega.
- [37] 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

- [38] 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.
- [39] M. Deaconu, *Processus stochastiques et EDP/Applications des espaces de Besov aux processus stochastiques*, Thèse de doctorat, Université Henri Poincaré, Nancy, 1997.

DEA and Master thesis

- [40] 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.
- [41] 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

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

Recent involvements in research projects with industrial partnerships

- **Collaboration with Venathec:** this is a research collaboration between the Tosca and Multispeech teams from Inria Nancy and Venathec, on the acoustic control of wind farms, start 2014. I supervise, with E. Vincent (researcher in Multispeech team), the PhD thesis of B. Dumortier on this topic.
- **Collaboration with the SME Alphability:** this was a research collaboration between the Tosca team in Nancy and the SME Alphability, on risk measures and rare events in finance, from 2011 to 2016. I was the coordinator of this project.

- **Contract with Gaz de France/Electrabel (2010-2011)**: this was a research contract between the 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.
- **Contract with Gaz de France (2010)**: this was a research contract between 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.
- **Contract with Calyon (2007-2009)**: this was a research contract between the Tosca team and Interest Rates and Hybrid Quantitative Research team of Calyon, on variance reduction techniques.

Teaching and students supervision

Students supervision

- Supervision, since October 2014, of the PhD of Baldwin Dumortier on acoustic control of wind farms. This topic includes the probabilistic approach of uncertainties.
- Supervision, since October 2013, of the PhD of Khaled Salhi on risk measures and portfolio optimization. The PhD Defense took place on December 2016.
- Supervision, in 2014-2015, of the postdoctoral fellowship of Oana Lupas̃cu, on the stochastic modelling for avalanche phenomena.
- Supervision, of the PhD of Paul Charton on the prices fixation on renewable energies markets.
- Supervision of the PhD of Numa Lescot, defended in 2012, in a collaboration between Tosca and Natixis, on variance reduction techniques for stochastic algorithms.
- Supervision, in 2008, of the postdoctoral fellowship of Samih Zein, on variance reduction techniques for Monte Carlo methods.
- Supervision of the PhD of S ebastien Chaumont, defended in 2002, on stochastic control problems.
- Supervision of 4 Master 2 Research internships (Marie Muzzolon 2017, Khaled Salhi 2013, Souhail Boukherouaa 2012, S ebastien Chaumont 2000).
- Supervision of 14 internships in the Tosca team for students coming from  cole Polytechnique in Paris,  cole Polytechnique of Tunisia and  cole des Mines in Nancy. The subjects are mainly in mathematical finance, stochastic calculus and Monte Carlo methods.
- Supervision of 10 scientific internships at levels Master 1 and Master 2.

Recent teaching activities

- Lectures on *Stochastic Differential Equations: numerical approach* in Master 2 at the  cole des Mines in Nancy (2015-2017).
- Lectures on *Random variables simulation* at  cole des Mines in Nancy (2011-2016).
- Lectures on *Stochastic Modelling* on Master 2 of Mathematics IMOI of the Lorraine University, (2009-2017).
- Lectures on *Monte Carlo Simulation* at Facult e de Gestion et  conomie, Nancy (2013-2017).
- Lectures on *Stochastic Differential Equations and stochastic calculus* in Master 2 Research at the University Henri Poincar e, Nancy (2006-2010).
- Lectures on *Monte Carlo Methods* at  cole des Mines in Nancy (2010-2011).

Animation and administrative activity

Editorial and scientific committee

- 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.

Expertise

- Member of the Committee of the XI^{ème} Colloque Franco-Roumain de Mathématiques Appliquées, 2012.
- Referee for: Stochastic Processes and Applications, Journal of Applied Probability, Journal of Computational Physics, Monte Carlo Methods and Applications, Physica D, SIAM Journal on Numerical Analysis (SINUM), SIAM Journal on Scientific Computing (SISC), Journal of Statistical Physics, Mathematical Modelling and Numerical Analysis, Potential Analysis, Statistics and Computing, Revue Roumaine de Mathématiques Pures et Appliquées, Journal of Computational and Applied Mathematics et Mathematics and Computers in Simulation.
- Permanent reviewer for *Mathematical Reviews*.
- Member of *MAS* Group in SMAI.

Committees member

- Member of **Bureau du Comité des Projets** of the Research Center Inria Nancy - Grand Est. My specific mission concerns the *interaction between applied mathematics and computer science*, since 2011.
- Member of **Comité des Projets** of the Research Center 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 Research Center 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 **Jury d’admissibilité Chargée de Recherche** of Inria Nancy - Grand Est, 2002-2009, 2014 and 2016.
- Member of the **Commission des Développements Technologiques** of the Research Center Inria Nancy - Grand Est, 2009-2012.
- Member of the **Commission de spécialistes 25/26** of the University Henri Poincaré, 2001-2008.
- Member of the **Commission locale pour les Postes d’accueils** of Inria Lorraine, 2001-2006.

- Member of the **Comité de sélection**, position Assistant professor Section 26, Lorraine University, 2012.
- Member of the **Comité de sélection**, position Assistant professor Section 26, Dijon University, 2015.
- Member of the **Comité de sélection**, position Assistant professor Section 26, Bordeaux University, 2015.

Animation

- Responsible of the Working Group **Risk measures in finance**, 2010-2016, between the SME Alphability and the Tosca team in Nancy.
- Member of the **Group MAS** bureau of the SMAI, 2004-2008.

Conferences organized

- 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>
- *Incertitudes : approches et défis*, 3 December 2013, Nancy.
<http://www.fr-hermite.univ-lorraine.fr/>
- Organization (with G. Pagès), of a special session at XI^{ème} Colloque Franco-Roumain de Mathématiques Appliquées, on *Numerical probabilities*, 24-30 August 2012, Bucarest.
- Workshop *Incertitudes*, 14-15 December 2009, Nancy.
- 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.

Visits abroad

- *Simion Stoilow Institute of Mathematics of the Romanian Academy*, Bucharest (invited by L. Beznea, December 2011, July 2013, June 2014, February 2017).
- *École Polytechnique Fédérale de Lausanne*, Lausanne (invited by F. Nobile, July 2012).

- *Institute for Scientific Computing & Applied Mathematics Indiana University* - Bloomington (invited by R. Temam, November 2010).
- *University of Concepción* and *PUC of Santiago* in Chile (invited by R. Reboledo, July 2007).
- *Lawrence Berkley National Laboratory*, Berkley (invited by A. Chorin, November 1997).
- February - July 1993, internship at *Middlesex University-London*, in the Tempus project, London (scholarship after a competitive selection), advisor D. Jarrett, 5 months.

Main conferences as invited speaker

- *Minisymposium on stochastic control and games* in *SIAM Conference on Control and its Applications*, 10-12 July 2017, Pittsburgh, Pennsylvania, USA.
- *XIII-ième Colloque Franco-Roumain de Mathématiques Appliquées*, 24-29 August 2016, Iași, Romania.
- *Invited conference to ALAC (Association des Assureurs Luxembourgeois) and ILAC (Institut Luxembourgeois des Actuaire)*, 10 March 2016.
- The Eighth Congress of Romanian Mathematicians, 26 June - 1st July 2015, Iași, Romania.
- Rencontre EDP/Probas, 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, Brașov, 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.