

Noufel Frikha

✉ noufel.frikha@univ-paris1.fr  My LinkedIn
 <https://nfrikha.pages.math.cnrs.fr/>



Research Interests

Probability  Stochastic analysis, stochastic control, numerical probability.
Mathematical Finance  Machine learning for finance, risk measures, ...

Employment History

2022 –  **Full professor of Mathematics**, Université Paris 1 Panthéon-Sorbonne, CES.
2012 – 2022  **Associate Professor - Maître de conférences**. Université Paris Cité, LPSM.

Education

2017  **HDR, Université Paris Cité, LPSM.**
HDR title: *Stochastic approximation, Markovian perturbation of stochastic processes and their applications.*
2008 – 2010  **Ph.D., Sorbonne Université, LPSM and ENGIE.** CIFRE contract.
Thesis title: *Contribution à la modélisation et à la gestion dynamique du risque des marchés de l'énergie.*

Research Publications

- 1 S. Crépey, N. Frikha, A. Louzi, and J. Spence, “An adaptive multilevel stochastic approximation algorithm for value-at-risk estimation,” Aug. 2024.
- 2 N. Frikha and A. Kohatsu-Higa, “On some asymptotic expansions of skew diffusions,” in *MATRIX: Mathematics of Risk Annals 2022, 2024*, pp. 429–448.
- 3 N. Frikha, A. Kohatsu-Higa, and L. Li, “Integration by parts formula for exit times of one dimensional diffusions,” in *Kolmogorov Operators and Their Applications*, S. Menozzi, A. Pascucci, and S. Polidoro, Eds., Singapore: Springer Nature Singapore, 2024, pp. 289–314, ISBN: 978-981-97-0225-1.
- 4 N. Frikha, H. Pham, and X. Song, “Full error analysis of policy gradient learning algorithms for exploratory linear quadratic mean-field control problem in continuous time with common noise,” Aug. 2024.
- 5 S. Crépey, N. Frikha, and A. Louzi, “A multilevel stochastic approximation algorithm for value-at-risk and expected shortfall estimation,” Mar. 2023.  URL: <https://arxiv.org/abs/2304.01207>.
- 6 S. Crépey, N. Frikha, A. Louzi, and G. Pagès, “Asymptotic error analysis of multilevel stochastic approximations for the value-at-risk and expected shortfall,” Nov. 2023.  URL: <https://arxiv.org/abs/2311.15333>.
- 7 N. Frikha, M. Germain, M. Laurière, H. Pham, and X. Song, “Actor-critic learning for mean-field control in continuous time,” 2023.  URL: <https://arxiv.org/pdf/2303.06993>.
- 8 J.-F. Chassagneux, J. Chen, and N. Frikha, “Deep Runge-Kutta schemes for BSDEs,” *arXiv preprint arXiv:2212.14372*, 2022.  URL: <https://arxiv.org/pdf/2303.06993>.

- 9 J.-F. Chassagneux, J. Chen, N. Frikha, and C. Zhou, "A learning scheme by sparse grids and picard approximations for semilinear parabolic pdes," *IMA - Journal of Numerical Analysis*, vol. 43, 2022.
 URL: <https://doi.org/10.1093/imanum/drac066>.
- 10 P.-E. Chaudru de Raynal and N. Frikha, "Well-posedness for some non-linear sdes and related pde on the wasserstein space," *Journal de Mathématiques Pures et Appliquées*, vol. 159, pp. 1–167, 2022, ISSN: 0021-7824.  DOI: <https://doi.org/10.1016/j.matpur.2021.12.001>.
- 11 J. Chen, N. Frikha, and H. Li, "Probabilistic representation of integration by parts formulae for some stochastic volatility models with unbounded drift," *IMA - Journal of Numerical Analysis*, vol. 26, 2022.
 URL: <https://doi.org/10.1051/ps/2022008>.
- 12 P.-E. Chaudru de Raynal and N. Frikha, "From the backward kolmogorov pde on the wasserstein space to propagation of chaos for mckean-vlasov sdes," *Journal de Mathématiques Pures et Appliquées*, vol. 156, pp. 1–124, 2021, ISSN: 0021-7824.  DOI: <https://doi.org/10.1016/j.matpur.2021.10.010>.
- 13 N. Frikha and L. Li, "Parametrix method for the first hitting time of an elliptic diffusion with irregular coefficients," *Stochastics*, vol. 93, no. 2, pp. 167–195, 2021.  DOI: 10.1080/17442508.2019.1711092.
eprint: <https://doi.org/10.1080/17442508.2019.1711092>.
- 14 N. Frikha and L. Li, "Well-posedness and approximation of some one-dimensional lévy-driven non-linear sdes," *Stochastic Processes and their Applications*, vol. 132, pp. 76–107, 2021, ISSN: 0304-4149.
 DOI: <https://doi.org/10.1016/j.spa.2020.10.002>.
- 15 N. Frikha, V. Konakov, and S. Menozzi, "Well-posedness of some non-linear stable driven sdes," *Discrete and Continuous Dynamical Systems*, vol. 41, no. 2, pp. 849–898, 2021, ISSN: 1078-0947.  DOI: 10.3934/dcds.2020302.
- 16 N. Frikha and L. Li, "Weak uniqueness and density estimates for SDEs with coefficients depending on some path-functionals," *Annales de l'Institut Henri Poincaré, Probabilités et Statistiques*, vol. 56, no. 2, pp. 1002–1040, 2020.  DOI: 10.1214/19-AHP992.
- 17 N. Frikha, A. Kohatsu-Higa, and L. Li, "Integration by parts formula for killed processes: a point of view from approximation theory," *Electronic Journal of Probability*, vol. 24, no. none, pp. 1–44, 2019.
 DOI: 10.1214/19-EJP352.
- 18 N. Frikha, "On the weak approximation of a skew diffusion by an euler-type scheme," *Bernoulli*, vol. 24, no. 3, pp. 1653–1691, 2018, ISSN: 13507265.  URL: <http://www.jstor.org/stable/26492050> (visited on 07/05/2024).
- 19 N. Frikha, "Stochastic approximation, markovian perturbation and their applications," Ph.D. dissertation, Université Paris Cité, 2017.  URL: <https://hal.science/tel-04017754/document>.
- 20 O. Bardou, N. Frikha, and G. Pagès, "Cvar hedging using quantization-based stochastic approximation algorithm," *Mathematical Finance*, vol. 26, no. 1, pp. 184–229, 2016.  DOI: <https://doi.org/10.1111/mafi.12049>. eprint: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/mafi.12049>.
- 21 N. Frikha, "Multi-level stochastic approximation algorithms," *The Annals of Applied Probability*, vol. 26, no. 2, pp. 933–985, 2016.  DOI: 10.1214/15-AAP1109.
- 22 N. Frikha and L. Huang, "A multi-step richardson–romberg extrapolation method for stochastic approximation," *Stochastic Processes and their Applications*, vol. 125, no. 11, pp. 4066–4101, 2015, ISSN: 0304-4149.  DOI: <https://doi.org/10.1016/j.spa.2015.05.016>.
- 23 N. Frikha, "Shortfall risk minimization in discrete time financial market models," *SIAM Journal on Financial Mathematics*, vol. 5, no. 1, pp. 384–414, 2014.  DOI: 10.1137/120903142. eprint: <https://doi.org/10.1137/120903142>.

- 24 M. Fathi and N. Frikha, "Transport-Entropy inequalities and deviation estimates for stochastic approximation schemes," *Electronic Journal of Probability*, vol. 18, no. none, pp. 1–36, 2013.  DOI: 10.1214/EJP.v18-2586.
- 25 N. Frikha and V. Lemaire, "Joint modelling of gas and electricity spot prices," *Applied Mathematical Finance*, vol. 20, no. 1, pp. 69–93, 2013.  DOI: 10.1080/1350486X.2012.658220. eprint: <https://doi.org/10.1080/1350486X.2012.658220>.
- 26 N. Frikha and S. Menozzi, "Concentration bounds for stochastic approximations," *Electronic Communications in Probability*, vol. 17, no. none, pp. 1–15, 2012.  DOI: 10.1214/ECP.v17-1952.
- 27 N. Frikha and A. Sagna, *Monte Carlo Methods and Applications*, vol. 18, no. 4, pp. 287–326, 2012.  DOI: doi:10.1515/mcma-2012-0011.
- 28 O. Bardou, N. Frikha, and G. Pagès, "Computation of VaR and CVaR using stochastic approximation and adaptive unconstrained importance sampling," *Monte Carlo Methods and Applications*, vol. 15, 2010.
- 29 O. Bardou, N. Frikha, and G. Pagès, "Recursive computation of Value-at-Risk and Conditional Value-at-Risk," *Monte Carlo and Quasi Monte Carlo methods 2008*, vol. 12, 2010.
- 30 N. Frikha, "Contribution à la modélisation et à la gestion dynamique du risque des marchés de l'énergie," Ph.D. dissertation, Université Pierre Marie Curie, 2010.  URL: <https://theses.hal.science/tel-00539962/>.

Phd Students

- 2018–2021  **Houzhi Li**, Analyse de certaines équations non-linéaires de type McKean-Vlasov et applications à la théorie stochastique de portefeuille. Defense: 30th March 2021. Co-supervision with P. Tankov.
- 2019–2022  **Junchao Chen**, Aspects théoriques et numériques de certaines EDPs non-linéaires: résolutions par méthodes d'apprentissage et applications à la finance. Defense: 24th March 2022. Co-supervision with J.-F. Chassagneux.
- 2021–2024  **Azar Louzi**, Multi-level learning schemes and financial applications. Defense: December 2024. Co-supervision with S. Crépey.
-  **Xuanye Song**, Mean-field Reinforcement learning in continuous time: theoretical and numerical aspects, and applications. Defense: December 2024. Co-supervision with H. Pham.
- 2022–  **Dounia Essaket**, Risques climatiques et risques extrêmes, Approche XVA. Start: October 2022. Co-supervision with S. Crépey.
- 2024–  **Martin Arnaiz Iglesias**, Some learning schemes for the Risk Budgeting problem. Start: October 2024.