CLÉMENT W. ROYER

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Assistant professor in optimization and data science.

CURRENT POSITION

Université Paris-Dauphine - PSL Since September 1, 2019
Faculty - Maître de conférences *Paris, France*

· Mathematics and Computer Sciences (*MIDO*) department;
· Machine Learning and Intelligent Systems (*MILES*) team, within the *LAMSADE* institute.

EDUCATION & PREVIOUS POSITIONS

University of Wisconsin-Madison November 2016-August 2019
Postdoctoral research associate *Madison, WI, USA*

· In the group of Stephen J. Wright, part of the *Data Science Hub*.

Institute for Research in Computer Science in Toulouse (IRIT) October 2013-October 2016
Research Assistant *Toulouse, France*

· In the Parallel Algorithms and Optimization (APO) Team.

INPT-ENSEEIHT Engineering school October 2013-September 2016
Teaching Assistant *Toulouse, France*

· Practical courses: Parallel Programming with OpenMP (in C); Linear Algebra, PDE Discretization Techniques, Krylov Space Methods and Numerical Optimization (using MATLAB).
· Tutorial classes: Differential Calculus, Analysis Tutorials.

PhD in applied mathematics 2013-2016
Obtained November 4, 2016 *UPS, University of Toulouse, France*

· Topic: Probabilistic properties and complexity analysis in derivative-free optimization methods.
· Co-advised by Serge Gratton (Univ. Toulouse) and Luís Nunes Vicente (Univ. Coimbra, Portugal).

Engineering and Master's Degree in Computer Science 2010-2013
Two degrees equivalent to Master's degree *INPT, University of Toulouse, France*

· Engineering Degree in Computer Science and Applied Mathematics, minor in Scientific Computing.
· Master's Degree in Computer Science, minor in Distributed Computing and Critical Software.

SKILLS

Main programming experience	Matlab, C, C++, Fortran.
Additional programming skills	Java, CamL, Maple, Julia.
Languages	French (native), English (fluent), Portuguese (intermediate), Spanish (scholar)

RESEARCH AND PUBLICATIONS

Research interests

- **Complexity in nonlinear optimization:** bound the worst-case cost of an algorithm to satisfy a certain criterion;
- **Introduction of randomness in optimization methods:** enhance their performance (and reduce their cost) using random techniques (sampling, perturbation) and randomized linear algebra;
- **Zeroth-order/derivative-free optimization:** complex problems for which derivatives are too expensive or not available.

Publications in refereed journals

Except in one case identified below, authors are always listed by alphabetical order.

- **A Newton-CG algorithm with complexity guarantees for smooth unconstrained optimization**. C. W. Royer, M. O'Neill and S. J. Wright. *Mathematical Programming*, available online.
- **Direct search based on probabilistic feasible descent for bound and linearly constrained problems**. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang. *Computational Optimization and Applications*, 72(3):525-559, 2019.
- **A decoupled first/second-order steps technique for nonconvex nonlinear unconstrained optimization with improved complexity bounds**. S. Gratton, C. W. Royer and L. N. Vicente. *Mathematical Programming*, available online.
- **Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization**. C. W. Royer and S. J. Wright. *SIAM Journal on Optimization*, 28(2):1448-1477, 2018.
- **Complexity and global rates of trust-region methods based on probabilistic models**. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang. *IMA Journal of Numerical Analysis*, 38(3):1579-1597, 2018.
- **A second-order globally convergent direct-search method and its worst-case complexity**. S. Gratton, C. W. Royer and L. N. Vicente. *Optimization: A Journal of Mathematical Programming and Operations Research*, 65(6):1105-1128, 2016.
- **Direct search based on probabilistic descent**. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang. *SIAM Journal on Optimization*, 25(3):1515-1541, 2015.

Submitted reports

- **A subsampling line-search method with second-order results**, E. Bergou, Y. Diouane, V. Kungurtsev and C. W. Royer, Technical report arXiv:1810.07211, 2018.
- **A stochastic Levenberg-Marquardt method using random models with application to data assimilation**, E. Bergou, Y. Diouane, V. Kungurtsev and C. W. Royer, Technical report arXiv:1807.02176, 2018.

RESEARCH PROJECTS

Mathematics of extreme rare events for complex systems US Department Of Energy

- Within the framework of *optimization under uncertainty*, applications in power networks.

Nonconvex matrix optimization US Department of Defense

- Studying nonconvex aspects of large-scale matrix optimization problems, in a *distributed data* setting, with application to the Internet-of-things.

Institute for Fundamentals in Data Science US National Science Foundation

- Gathers expertise on all aspects of data science (computer science, maths, statistics) and applications (bio-informatics, biology).