Luiz Rafael dos Santos

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Departament of Mathematics
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1 Main research interests

- Continuous Optimization
- Mathematical Programming
- Operational Research
- Machine Learning
- Power generation models and algorithms
- Numerical Analysis
- Data science and visualization
- Applications of Fuzzy sets

2 Education

2009–2014 **Ph.D. in Applied Mathematics**, Universidade Estadual de Campinas, Campinas, SP, Brazil;

Awarded on: 31st July 2014
Supervisor: Prof. Aurelio Ribeiro Leite de Oliveira
Ph.D. visiting student (in 2012) under the supervision of Prof. Jacek Gondzio at University of Edinburgh, Scotland, UK

2005–2008 **M.Sc. in Applied Mathematics**, Universidade Estadual de Campinas, Campinas, SP, Brazil;

Awarded on: 2nd September 2008
Supervisor: Prof. Rodney Bassanezi

1999–2004 **B.S. in Mathematics**, Universidade Regional de Blumenau, Blumenau, SC, Brazil;

3 Positions

2023 **Visiting Assistant Professor**, Management Sciences & Engineering, Stanford University, Stanford, CA, USA.

2014–now **Assistant Professor (tenured)**, Departamento de Matemática, Universidade Federal de Santa Catarina, Blumenau, SC, Brazil.

2012–2014 **Assistant Professor (tenure track)**, Instituto Federal Catarinense, Balneário Camboriú, SC, Brazil.

2009–2012 **Graduate Researcher/Teaching assistant**, Universidade Estadual de Campinas, Campinas, SP, Brazil.

2000–2008 **Faculty administrative staff/IT technician**, Universidade Regional de Blumenau, Blumenau, SC, Brazil.

4 Publications

Academic papers submitted to refereed journals

[1] R. Behling, Y. Bello-Cruz, A. Iusem, D. Liu, and **L.-R. Santos**. "A Successive Centralized Circumcenter Reflection Method for the Convex Feasibility Problem". 2022. arXiv: 2212.06911 [math].

[2] R. Behling, Y. Bello-Cruz, A. N. Iusem, and **L.-R. Santos**. "On the Centralization of the Circumcentered-Reflection Method". 2021. arXiv: 2111.07022.

Academic papers accepted in refereed journals

[3] R. Arefidamghani, R. Behling, A. N. Iusem, and **L.-R. Santos**. "A Circumcentered-Reflection Method for Finding Common Fixed Points of Firmly Nonexpansive Operators". In: *Journal of Applied and Numerical Optimization* (to appear) (2023). arXiv: 2203.02410.

[4] R. Behling, Y. Bello-Cruz, H. Lara-Urdaneta, H. Oviedo, and **L.-R. Santos**. "Circumcentric Directions of Cones". In: *Optimization Letters* (2023). DOI: 10.1007/s11590-022-01923-4. arXiv: 2112.08314.

[5] R. Filippozzi, D. S. Gonçalves, and **L.-R. Santos**. "First-Order Methods for the Convex Hull Membership Problem". In: *European Journal of Operational Research* 306.1 (2023), pp. 17–33. DOI: 10.1016/j.ejor.2022.08.040. arXiv: 2111.07720.

[6] G. H. M. Araújo, R. Arefidamghani, R. Behling, Y. Bello-Cruz, A. Iusem, and **L.-R. Santos**. "Circumcentering Approximate Reflections for Solving the Convex Feasibility Problem". In: *Fixed Point Theory and Algorithms for Sciences and Engineering* 2022.1 (2022), p. 30. DOI: 10.1186/s13663-021-00711-6. arXiv: 2105.00497.

[7] R. Arefidamghani, R. Behling, Y. Bello-Cruz, A. N. Iusem, and **L.-R. Santos**. "The Circumcentered-Reflection Method Achieves Better Rates than Alternating Projections". In: *Comput Optim Appl* 79.2 (2021), pp. 507–530. DOI: 10.1007/s10589-021-00275-6. arXiv: 2007.14466.

[8] R. Behling, Y. Bello-Cruz, and **L.-R. Santos**. "Infeasibility and Error Bound Imply Finite Convergence of Alternating Projections". In: *SIAM Journal on Optimization* 31.4 (2021), pp. 2863–2892. DOI: 10.1137/20M1358669. arXiv: 2008.03354.

[9] R. Behling, Y. Bello-Cruz, and **L.-R. Santos**. "On the Circumcentered-Reflection Method for the Convex Feasibility Problem". In: *Numer. Algorithms* 86 (2021), pp. 1475–1494. DOI: 10.1007/s11075-020-00941-6. arXiv: 2001.01773.

[10] R. Behling, Y. Bello-Cruz, and **L.-R. Santos**. "The Block-Wise Circumcentered–Reflection Method". In: *Comput Optim Appl* 76.3 (2020), pp. 675–699. DOI: 10.1007/s10589-019-00155-0. arXiv: 1902.10866.

[11] L. F. Bueno, G. Haeser, and **L.-R. Santos**. "Towards an Efficient Augmented Lagrangian Method for Convex Quadratic Programming". In: *Comput Optim Appl* 76.3 (2020), pp. 767–800. DOI: 10.1007/s10589-019-00161-2.

[12] **L.-R. Santos**, F. R. Villas-Bôas, A. R. L. Oliveira, and C. Perin. "Optimized Choice of Parameters in Interior-Point Methods for Linear Programming". In: *Comput Optim Appl* 73.2 (2019), pp. 535–574. DOI: 10.1007/s10589-019-00079-9.

[13] R. Behling, Y. Bello-Cruz, and **L.-R. Santos**. "Circumcentering the Douglas–Rachford Method". In: *Numer Algor* 78.3 (2018), pp. 759–776. DOI: 10.1007/s11075-017-0399-5. arXiv: 1704.06737.

[14] R. Behling, Y. Bello-Cruz, and **L.-R. Santos**. "On the Linear Convergence of the Circumcentered-Reflection Method". In: *Operations Research Letters* 46.2 (2018), pp. 159–162. DOI: 10.1016/j.orl.2017.11.018. arXiv: 1711.08651.

[15] A. S. Siqueira, R. C. da Silva, and **L.-R. Santos**. "Perprof-Py: A Python Package for Performance Profile of Mathematical Optimization Software". In: *Journal of Open Research Software* 4.e12 (2016), p. 5. DOI: 10.5334/jors.81.

[16] **L.-R. Santos** and R. C. Bassanezi. "Sistemas P-fuzzy Unidimiensionais Com Condição Ambiental". In: *Biomatemática* 19.1 (2009), pp. 11–24.

Papers in proceedings of conferences

[17] R. Filippozzi, D. S. Gonçalves, and **L.-R. Santos**. "First-order methods for the convex-hull membership problem and applications". In: *Proceeding Series of the Brazilian Society of Computational and Applied Mathematics*. Congresso Brasileiro de Matemática Aplicada e Computcional. Vol. 9. 1 1. Campinas, SP: SBMAC, 2022.

[18] P. C. R. Ertel and **L.-R. Santos**. "Otimização e análise teórica das máquinas de vetores suporte aplicadas à classificação de dados". In: *Proceeding Series of the Brazilian Society of Computational and Applied Mathematics*. Congresso Nacional de Matemática Aplicada e Computacional. Vol. 8. 1. Campo Grande, MS: SBMAC, 2021.

[19] F. L. Loução Jr., M. S. Mathias, C. Sagastizábal, **L.-R. Santos**, and F. N. C. Sobral. "Hydro-Reservoir Management and Unit-Commitment in Energy Optimization". In: *Mathematics in Industry Reports*. VI Brazilian Study Group with Industry. São Carlos, SP: Cambridge Open Engage, 2021. DOI: 10.33774/miir-2021-6qw7r.

[20] T. da Silva and **L.-R. Santos**. "Métodos iterativos para solução de sistemas lineares: aceleração usando reflexões circuncentradas". In: *Proceeding Series of the Brazilian Society of Computational and Applied Mathematics*. Congresso Nacional de Matemática Aplicada e Computacional. Vol. 8. 1. Campo Grande, MS: SBMAC, 2021.

Dissertations

[21] **L.-R. Santos**. "Optimized Choice of Parameters in Interior-Point Methods for Linear Programming". PhD's thesis (in portuguese). Campinas: IMECC/Unicamp, 2014. DOI: 10.47749/T/UNICAMP.2014.931062.

[22] **L.-R. Santos**. "Strategies for pests control: p-fuzzy systems and hybrid control". Master's thesis (in portuguese). Campinas: IMECC/Unicamp, 2008. DOI: 10.47749/T/UNICAMP.2008.434021.

5 Selected grants, scholarships and honors

2022: **Class patron and commencement speaker, honored by the Mathematics class of 2022 – UFSC**, Blumenau, SC, Brazil.

2022: (R$ 12,600.00) **ADC - Knowledge diffusion grant (102970/2022-0)** – CNPq, Brazil

2019: **Class patron, honored by the Mathematics class of 2019 – UFSC**, Blumenau, SC, Brazil.

2018: (R$ 5,000.00) **Open arms – travel support for young Mathematicians by International Mathematical Union** – International Conference on Mathematics, Rio de Janeiro, RJ, Brazil.

2018: (R$ 2,000.00) **Travel support by UFSC** – International Symposium on Mathematical Programming (ISMP2018), Bordeaux, France.

2015: (US$ 3,000.00) **Travel Support by PAEX-CAPES/Brazil** – International Symposium on Mathematical Programming (ISMP2015), Pittsburgh, PA, US.

2009–2012: (R$ 120,000.00) **Ph.D. Scholarship**, FAPESP, Brazil;

2010: (R$ 2,500.00) **Travel support by SOBRAPO/ALIO/INFORMS** – ELAVIO Summer School, Bento Gonçalves, Brazil.

2009–2012: (R$ 20,700.00) **M.Sc. Scholarship**, CAPES, Brazil.

6 Selected peer-reviews and conference services

2020-now **Associate editor:** Proceeding Series of the Brazilian Society of Computational And Applied Mathematics

2014-now: **Reviewer:** Numerical Algorithms; Pesquisa Operacional (online); Computational And Applied Mathematics; Tendências em Matemática Aplicada e Computacional; Rairo-Operations Research; Optimization Letters; Computational Optimization and Applications; Journal of Optimization Theory and Applications.

2019-2022 **Member of the general organizer committee** from 2019, 2021 and 2022 editions of *Brazilian Conference on Applied and Computational Mathematics* (CNMAC) – Sociedade Brasileira de Matemática Aplicada e Computacional (SBMAC), Brazil.

2021: **Committee member** of the Best 2019-2021 Master's thesis in Applied and Computational Mathematics (Odelar Linhares post-graduation award) – Sociedade Brasileira de Matemática Aplicada e Computacional, Brazil.

2018 **Co-chair** of the "*Meeting in Applied and Computational Mathematics (ERMAC)*", UFSC/Sociedade Brasileira de Matemática Aplicada e Computacional (SBMAC), Blumenau, SC, Brazil.

2017 **Co-organizer** of the "*Continuous Optimization*" session on the 31st Brazilian Colloquium of Mathematics – Sociedade Brasileira de Matemática (SBM), Brazil.

7 Supervisions

Ph.D. students

Ongoing Ph.D. thesis of Rafaela Filippozzi (co-advisor), Mathematics, UFSC, Florianópolis, SC, Brazil.

M.Sc. students

2020-2021 Master thesis of Leonardo de Liz Brockveld, Mathematics, UFSC, Blumenau, SC, Brazil.

2020-2021 Master thesis of Maria Claudia Schmitt Araújo, Mathematics, UFSC, Blumenau, SC, Brazil.

2020-2021 Master thesis of Guilherme Henrique Macieira Araújo (co-advisor), Applied Mathematics, FGV, Rio de Janeiro, RJ, Brazil.

2018-2019 Master thesis of Rafaela Filippozzi (co-advisor), Mathematics, UFSC, Florianópolis, SC, Brazil.

8 Teaching experience

8.1 Administrative responsibilities

2021-now **Member of UFSC university council**, representing the tenured tracked professors from the Center of Technology, Exact Sciences and Education (CTE), Campus UFSC-Blumenau, SC, Brazil.

2018–2022 **Head of the Laboratory of Applied and Computational Mathematics**, Department of Mathematics, UFSC, Blumenau, SC, Brazil.

2017-2021 **Member of the board** of the Master program in Mathematics, UFSC, Blumenau, SC, Brazil.

2016 **Member of the committee for recruitment** for tenured tracked positions in applied mathematics, UFSC, Blumenau, SC, Brazil.

2015–2016 **Chair of the Department of Mathematics**, UFSC, Blumenau, SC, Brazil.

8.2 Selected courses taught at UFSC

- **Numerical methods.** B.S. in Mathematics and Engineering.
- **Applied linear algebra.** B.S. in Mathematics and Engineering.
- **Continuous Optimization.** B.S. in Mathematics
- **Single-Variable Calculus.** B.S. in Mathematics and Engineering.

- **Multi-Variable Calculus.** B.S. in Mathematics and Engineering.
- **Operations Research: Modeling and software.** B.S. in Engineering.

9 Computer-related skills

Julia: Advanced mastering in Julia Language, including research and teaching. Excellent skills in coding optimization and numerical linear algebra algorithms as well as in JuMP modelling language for optimization, have written several algorithms and contributed to open source programs (see my GitHub page).

Python, R and Matlab: Advanced user for both research and teaching.

C/C++ and Fortran: Intermediate coding skills.

Git: Advanced user in version control systems, have working in different modules and contributing to team works with pull requests.

Unix: Advanced mastering in Unix and macOS systems. Well versed in Windows operating systems.

10 Miscellany

Languages: Portuguese (mother tongue), English (Fluent), Spanish (Advanced), French (Intermediate).

2016–now Supervised 15+ under-grad final monographs and scientific reports in applied mathematics

Hobby: Basketball (amateur) player.

Other alias: Luiz-Rafael Santos