Curriculum Vitae

Filippo Zanetti

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Contact information

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Experience

- ▷ Postdoctoral Research Associate 09/2023-12/2023
  University of Edinburgh, School of Mathematics
  Development of a factorization-based interior point method for the HiGHS software library
  Supervisor: Dr Julian Hall
- ▷ Tutor and Teaching Assistant 2018-2023
  - Tutor at the University of Padua: calculus, numerical analysis.
  - Tutor at the University of Edinburgh: calculus, linear algebra, optimization, OR.
  - Teaching assistant at the winter school *Advanced Methods for Mathematical Image Analysis*, Bologna, 18-25 January 2023.

Education

- ▷ PhD in *Optimization and Operational Research* 09/2019-09/2023
  University of Edinburgh, School of Mathematics
  Thesis: *Efficient interior point algorithms for large scale convex optimization problems*
  Supervisors: Prof Jacek Gondzio, Dr John Pearson
- ▷ Master's Degree in *Mathematical Engineering* 09/2017-09/2019
  University of Padua, 110/110 with honors
  Thesis: *Block preconditioners for saddle point linear systems arising in the finite elements discretization of the Navier-Stokes equations.*
  Supervisor: Prof Luca Bergamaschi
- ▷ Bachelor's Degree in *Aerospace Engineering* 09/2014-07/2017
  University of Padua, 110/110 with honors
  Thesis: *Acceleration of the Jacobi-Davidson method with low-rank preconditioners for the computation of eigenvalues of large and sparse matrices.*
  Supervisor: Prof Luca Bergamaschi

Publications

– S. Cipolla, J. Gondzio and F. Zanetti. *A regularized interior point method for sparse optimal transport on graphs.* European J Oper Res, **2023**. `https://doi.org/10.1016/j.ejor.2023.11.027`
– F. Zanetti and J. Gondzio. *An interior-point-inspired algorithm for linear programs arising in discrete optimal transport.* INFORMS J Comput *35*, 5, **2023**. `https://doi.org/10.1287/ijoc.2022.0184`
– F. Zanetti and J. Gondzio. *A new stopping criterion for Krylov solvers applied in interior point methods.* SIAM J Sci Comput *45*, 2, **2023**. `https://doi.org/10.1137/22M1490041`
– J. Gondzio, M. Lassas, S. Latva-Aijo, S. Siltanen and F. Zanetti. *Material-separating regularizer for multi-energy X-ray tomography.* Inverse Problems *38*, 2, **2022**. `https://doi.org/10.1088/1361-6420/ac4427`
– F. Zanetti and L. Bergamaschi. *Scalable block preconditioners for linearized Navier-Stokes equations at high Reynolds number.* Algorithms *13*, 199, **2020**. `https://doi.org/10.3390/a13080199`

Preprints

– S. Latva-Äijö, F. Zanetti, A. Honkanen, S. Huotari, J. Gondzio, M. Lassas, S. Siltanen. *Inner product regularized multi-energy X-ray tomography for material decomposition.* arXiv:2309.04479, **2023**.

Other publications

– F. Zanetti. *Efficient interior point algorithms for large scale convex optimization problems.* PhD Thesis, **2023**. `http://dx.doi.org/10.7488/era/4009`

– F. Zanetti. *Block preconditioners for saddle point linear systems arising in the FE discretization of the Navier-Stokes equations.* Master's Thesis, **2020**. `https://hdl.handle.net/20.500.12608/21375`

– L. Bergamaschi, A. Martinez and F. Zanetti. *A two-stage Jacobi-Davidson method with spectral preconditioners for the eigensolution of large SPD matrices.* Proceedings of the 17th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2017, pp. 300-303, **2017**.

Conferences

Invited talks

– *Accuracy and early termination of Krylov solvers in interior point methods*, Numerical Methods for Large Scale Problems. 8 June 2022, Belgrade.

Contributed talks

– *A Hybrid Interior-Point-Column-Generation Method for Discrete Optimal Transport Problems*, SIAM Conference on Optimization. 2 June 2023, Seattle.

– *A sparse interior point method for linear programs arising in optimal transport*, 19$^{\text{th}}$ Workshop on Advances in Continuous Optimization. 30 July 2022, Lisbon.

– *New indicators for the early termination of the linear solver in Interior Point Methods*, 7$^{\text{th}}$ IMA Conference on Numerical Linear Algebra and Optimization. 29 June 2022, Birmingham.

– *Interior point method applications for very large problems arising in imaging and optimal transport*, Modern Techniques of Very Large Scale Optimization. 20 May 2022, Edinburgh.

– *New indicators for the early termination of the linear solver in interior point methods*, Recent Advances in Numerical Linear Algebra for PDEs, Optimization, and Data Assimilation. 12 April 2022, Edinburgh.

– *A new stopping criterion for Krylov solvers applied in Interior Point Methods*, 31$^{\text{st}}$ European Conference on Operational Research. 13 July 2021, Athens (hybrid).

– *A new stopping criterion for Krylov solvers applied in Interior Point Methods*, 18$^{\text{th}}$ Workshop on Advances in Continuous Optimization. 9 July 2021, Toulouse (hybrid).

Other talks

– *Solving very large scale discrete optimal transport problems in linear time*, Polish Academy of Science Mechanics Committee. 17 February 2023, online.

– *Interior Point Methods for Optimal Transport with imaging applications*, OptimizEd wORld seminar series. 28 September 2022, Edinburgh.

– *Interior point methods for optimization problems arising in imaging and optimal transport*, SIAM UKIE National Student Chapter Conference. 23 June 2022, Edinburgh.

Organized

– Co-organizer of the workshop *Modern Techniques of Very Large Scale Optimization.* 19-20 May 2022, Edinburgh.

Skills

– Languages: Italian, English

– Programming: Matlab, C/C++, Fortran, Python

– Other: Latex, Office, HTML, MPI, Bash

Reviewer for the following journals

- SIAM Journal on Scientific Computing
- Computational Optimization and Applications
- Optimization Methods and Software
- Journal of Scientific Computing
- Computers and Operations Research

Awards & Scholarships

- *School of Mathematics/Oracle Labs* PhD scholarship (Sep 2019 - Feb 2023)
- Extended PhD funding from *HiGHS* (Mar 2023 - Aug 2023)
- Associate Fellow of the Higher Education Academy, AFHEA (2021)
- *SIAM Student Travel Award* for the SIAM Conferences LA21, OP21, OP23. Total value $\approx 1,100$USD
- *Laura Wisewell Fund Award* to participate at the conferences 31^{st} European Conference on Operational Research (2021), 7^{th} IMA Conference on Numerical Linear Algebra and Optimization (2022). Total value $\approx$ 500GBP