Monica Dessole

Curriculum Vitae

Leonardo Labs, Via Raffaele Pieragostini 80
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born on 27th September 1991

Research interests

My research focuses on numerical and computational linear algebra, and it is concerned with the development of efficient algorithms for scientific computing and the implementation of high-quality scientific software, primarily parallel solvers for differential equations and methods for analyzing very large matrices and datasets.

Research & Work Experiences

Feb 2022 – Ongoing **Research Fellow**, Leonardo Labs, HPC/Cloud division
Project: Numerical modelling on GPUs, deployment of BigData tools and frameworks.

2017/18 **Junior Research Fellow**, Università degli Studi di Padova
Project: Massively parallel numerical methods for the iterative solution of time-dependent Navier-Stokes equations, application to dual-fluid flow simulations.
Keywords: computational fluid dynamics; ILU preconditioning; GPU computing.

Education

2022 **Ph.D. in Computational Mathematics**, Università degli Studi di Padova
Thesis: "Topics in Numerical Linear Algebra for High-Performance Computing"
Keywords: low-rank models; sparse recovery; nonnegative optimization; parallel algorithms; computational fluid dynamics; ILU preconditioning; boundary value problems.

2017 **Master's Degree in Mathematics**, Università degli Studi di Padova
Thesis: "An hybrid model for solving the variable density incompressible Navier-Stokes equations on GPUs"

2014 **Bachelor's Degree in Mathematics**, Università degli Studi di Padova
Thesis: "The inverse shortest path problem"

International Experiences

Feb 2020 **Visiting PhD student**, IRIT Toulouse, France

Sep 2015 – Feb 2016 **"ERASMUS+ Programme"**, Université Lille 1 - Sciences et Technologies, France
Master 2 Calcul Scientifique - UFR de Mathématiques

Publications

[1] M. Dessole, F. Marcuzzi, *"Deviation Maximization for Rank Revealing QR factorizations"*. Numerical Algorithms, 2022.

[2] M. Dessole, F. Marcuzzi, M. Vianello *"dCATCH—A Numerical Package for d-Variate near G-Optimal Tchakaloff Regression via Fast NNLS"*. Mathematics, 2020.

[3] M. Dessole, F. Marcuzzi, *"A massively-parallel algorithm for Bordered Almost Block Diagonal systems on GPUs"*. Numerical Algorithms, 2020.

[4] M. Dessole, F. Marcuzzi, M. Vianello *"Accelerating the Lawson-Hanson NNLS*

solver for large-scale Tchakaloff regression designs". Dolomites Research Notes on Approximation, 2020.

[5] M. Dessole, F. Marcuzzi, *"Fully iterative ILU preconditioning of the unsteady Navier-Stokes equations for GPGPU"*. Computers & Mathematics with Applications, 2019.

Personal funding and grants

July 2022 Kovalevskaya Grant for participation at "ICM2022 – International Congress of Mathematicians", Saint Petersburg, Russia – held Online

Oct–Nov 2021 Grant for participation at "Moxoff Academy" at Moxoff SpA, Milan, Italy
Amount: 4k euros

Jun 2019 Grant for participation at "Gene Golub SIAM Summer School (G2S3) on High Performance Data Analytics", Aussois, France

Oct 2018 – Sep 2021 PhD fellowship funded by beanTech Srl for three years doctoral studies at Università degli Studi di Padova, Italy

Accepted Abstracts, Presentations and Posters

14 – 15 Feb 2022 *"Due giorni di Algebra Lineare Numerica"*, Naples, Italy
Talk title: "Deviation Maximization for rank-deficient problems"

28 May 2021 *"Rita PhD Seminar"*, Online
Talk title: "Numerical Linear Algebra for Caratheodory-Tchakaloff compression"

15–18 Jan 2020 *"Multivariate Approximation: Theory and Applications"*, Perugia, Italy
Poster title: "Efficient computation of large-scale Tchakaloff regression designs"

11–12 Jul 2019 *"Sparse Days"*, Toulouse, France
Talk title: "A massively-parallel algorithm for BABD systems on GPUs"

18–19 Feb 2019 *"Due giorni di Algebra Lineare Numerica"*, Rome, Italy
Talk title: "Solving ABD systems on GPUs"

3–4 May 2018 *"Seminari Padovani di Analisi Numerica"*, Padova, Italy
Talk title: "On the Approximate Solution of Sparse Triangular Systems on GPUs"

8–9 Feb 2018 *"Due giorni di Algebra Lineare Numerica e Applicazioni"*, Padova, Italy
Talk title: "On the Approximate Solution of Sparse Triangular Systems for Massively Parallel Machines"

Attended Schools

4–8 Oct 2021 *Model Order Reduction with Python*,
Mathematics Münster Cluster of Excellence, Münster, Germany

29–03 Jul 2021 *Model Order Reduction and Applications*,
Fondazione CIME, Cetraro, Italy

7–11 Oct 2019 *Mathematical and Computational Aspects of Machine Learning*,
Scuola Normale Superione, Pisa, Italy

17–28 Jun 2019 Invited attendee to the *Gene Golub SIAM Summer School (G2S3) on High Performance Data Analytics*,
Aussois, France

27–31 Aug 2018 *EURASIP Summer School on Tensor-Based Signal Processing*,
KU Leuven, Belgium

Teaching and Tutoring

Online **Teaching for "Scientific Computing with Python"**
Massive Online Open Course on EduOpen Platform, Università degli Studi di Padova

2021/22 **Teaching assistant for "Numerical Calculus"**
2020/21 Bachelor's Degree in Mathematics, Università degli Studi di Padova
2019/20 Course held by Prof. Marco Vianello

2020/21 **Teaching for "Introduction to Python"**
Extracurricular course of Master's Degrees in Economics, Università degli Studi di Padova

2017/18 **Teaching assistant for "Computer Programming"**
Bachelor's Degree in Mathematics, Università degli Studi di Padova
Course held by Prof. Fabio Aiolli

Computer skills

Programming *Advanced*: C, CUDA (GPU programming), Python, Matlab
Basic: Fortran, C++, MPI, OpenMP

Scientific computing Pandas, SciPy, NumPy, Matplotlib, FEniCS, PyMOR, MAGMA, LaPACK, scaLAPACK, PETSc

Miscellaneous Linux/Unix operating systems, Git version control system

Languages

Italian (native), English (fluent), French (intermediate)