

« Scientific computing, linear solvers, numerical analysis, HPC »

Research positions

Dec. 2021 **Postdoctoral researcher** at [Politecnico di Milano](#) (MOX lab) supervised by **Paola Antonietti**

2018-2021 **Ph.D student**, under the supervision of **Ulrich Rüde** ([Chair of System Simulation](#), FAU Erlangen-Nürnberg, Germany) and **Daniele A. Di Pietro** ([IMAG](#), Univ. of Montpellier, France), in collaboration with [CERFACS](#), [IRIT](#) and [EDF R&D](#).

Thesis: *Fast solvers for robust discretizations in CFD*

Development of novel geometric and algebraic multigrid solvers for statically condensed linear systems arising from Hybrid High-Order (HHO) discretizations of elliptic partial differential equations.

Programming: Development from scratch of parallel DG (SIPG) and HHO solvers for diffusion problems, managing arbitrary order of approximation and unstructured 2D and 3D meshes. Various iterative methods can solve the linear systems, amongst which the multigrid algorithms for trace systems developed during the Ph.D.

Teaching at [ENSEEIH](#)T and [ISAE-Supaero](#) (~100 hours): Differentiable and convex optimization, Scientific computing, ODE/PDE, Linear algebra for Data Mining, Advanced linear algebra and iterative methods.

Scientific Computing Numerical Linear Algebra Parallel Algorithms Multigrid
Hybrid High-Order C++ Matlab MPI Slurm

Engineering positions

2015-2018 **Software engineer** at [Acetiam](#) (Sophia-Antipolis, France): development of medical software

Medical imaging C# Javascript NoSQL

2008-2015 **R&D engineer, project manager, tech lead** at [Itron](#) (Paris, France / Liberty Lake, WA, USA): development of remote reading solutions for energy meters

Energy Telecommunications Symmetric keys C# Java PHP

2006-2008 **Software engineer** at [Crédit Agricole](#) (Paris): development of trading infrastructure

Finance C++ SQL

Education

2021 **Ph.D** in Applied Mathematics. French-German cotutelle between [University of Montpellier](#) and [Friedrich Alexander Universität \(FAU\), Erlangen-Nürnberg](#)

2006 **Master's Degree** in Applied Mathematics and Computer Science, [ENSTA Paris](#) / [ENSEEIH](#)T Toulouse

Publications

In preparation:

- D. A. Di Pietro, F. Hülsemann, P. Matalon, P. Mycek, U. Rüde, D. Ruiz, *High-order multigrid strategies for HHO discretizations of elliptic equations*

Submitted:

- D. A. Di Pietro, F. Hülsemann, P. Matalon, P. Mycek, U. Rüde, D. Ruiz, *Algebraic multigrid preconditioner for statically condensed systems arising from lowest-order hybrid discretizations*
Preprint: hal.archives-ouvertes.fr/hal-03272468

Published:

- D. A. Di Pietro, F. Hülsemann, P. Matalon, P. Mycek, U. Rüde, D. Ruiz, *Towards robust, fast solutions of elliptic equations on complex domains through HHO discretizations and non-nested multigrid methods*, **International Journal for Numerical Methods in Engineering**, 122(22):6576-6595, 2021
DOI: [10.1002/nme.6803](https://doi.org/10.1002/nme.6803), Open access: hal.archives-ouvertes.fr/hal-03163476
- D. A. Di Pietro, F. Hülsemann, P. Matalon, P. Mycek, U. Rüde, D. Ruiz, *An h-multigrid method for Hybrid High-Order discretizations*, **SIAM Journal on Scientific Computing**, 43(5):S839-S861, 2021
- DOI: [10.1137/20M1342471](https://doi.org/10.1137/20M1342471), Open access: hal.archives-ouvertes.fr/hal-02434411

Thesis:

P. Matalon, *Fast solvers for robust discretizations in computational fluid dynamics*, Ph.D thesis, 2021
Open access: tel.archives-ouvertes.fr/tel-03401691

Poster:

P. Matalon, *Fast solvers for Hybrid High-Order discretizations*, CERFACS PhD Day 2021
hal.archives-ouvertes.fr/hal-03228427

Talks at international conferences

1. *Algebraic multigrid preconditioner for statically condensed systems arising from lowest-order hybrid discretizations* (+ paper for the student paper competition), **Copper Mountain Conference on Multigrid Methods 2021** (online)
2. *Toward robust, fast solutions of elliptic equations on complex domains through HHO discretizations and non-nested multigrid methods*, **Sparse Days 2020** (online)
3. *An h-multigrid method for Hybrid High-Order discretizations*, **Copper Mountain Conference on Iterative Methods 2020** (cancelled due to Covid-19, participation to the student paper competition)

Peer-review

For **IMA Journal on Numerical Analysis**