

# Davide Pradovera

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Born on October 9, 1993, in Piacenza, Italy.  
Nationality: Italian.

## Current position

*University assistant and post-doctoral researcher*, Chair of Numerics of PDEs, University of Vienna.

## Areas of specialization

Numerical mathematics for partial differential equations, approximation theory, model order reduction, frequency-domain applications, scattering problems.

## Appointments held

- 2014–2017 [ *Special courses teacher*, Piacenza (I).
- 2016 [ *Developer intern*, Iren SpA, Piacenza (I).
- 2017–2021 [ *Doctoral assistant*, EPFL, Lausanne (CH).
- 2022 [ *Post-doctoral researcher*, EPFL, Lausanne (CH).
- 2022–now [ *University assistant and post-doctoral researcher*, University of Vienna, Vienna (A).

## Education

- 2012–2015 [ BSc in Applied Mathematics (*cum laude*), Politecnico di Milano, Milan (I).  
Thesis: “A mathematical justification of the momentum operator in quantum mechanics”.  
Advisor: Prof. M. Verri.
- 2015–2017 [ MSc in Computational Science and Engineering, EPFL, Lausanne (CH).  
Project: “Implementation of smooth contact mechanics with the mortar method”.  
Advisor: Prof. G. Ancaux.  
Project: “Finite elements-based Padé approximants for Helmholtz frequency response problems”.  
Advisor: Prof. F. Nobile.  
Thesis: “Randomized low-rank approximation of matrices and tensors”.  
Advisor: Prof. D. Kressner.

- 2017–2021 [ PhD in Mathematics, EPFL, Lausanne (CH).  
Thesis: “Model order reduction based on functional rational approximants for parametric PDEs with meromorphic structure”.  
Advisor: Prof. F. Nobile.

## Grants, honors, and awards

- 2011 [ 3<sup>rd</sup> place at the “Hong Kong International Science Fair”.  
2013 [ 4<sup>th</sup> place in the “Championnat International des Jeux Mathématiques et Logiques”.  
2014 [ 5<sup>th</sup> place in the “Championnat International des Jeux Mathématiques et Logiques”.  
2017 [ Douchet prize for best GPA, MATH-EPFL.  
2020 [ Prize for exceptional teaching service, Section of Mathematics, EPFL.  
2021 [ Junior Research Fellowship at ESI Vienna.

## Publications and talks

### Journal articles

- 2019 [ F. Bonizzoni and DP, “Distributed sampling for rational approximation of the acoustic scattering of an airfoil”, PAMM 19.  
2020 [ F. Bonizzoni, F. Nobile, I. Perugia, and DP, “Fast Least-Squares Padé approximation of problems with normal operators and meromorphic structure”, Math. Comput. 89.  
F. Bonizzoni, F. Nobile, I. Perugia, and DP, “Least-Squares Padé approximation of parametric and stochastic Helmholtz maps”, Adv. Comput. Math. 46.  
[ DP, “Interpolatory minimal rational model order reduction of parametric problems lacking uniform inf-sup stability”, SIAM J. Numer. Anal. 58.  
2021 [ F. Bonizzoni and DP, “Shape optimization for a noise reduction problem by non-intrusive parametric reduced modeling”, Proc. WCCM-ECCOMAS2020.  
DP and F. Nobile, “Frequency-domain non-intrusive greedy Model Order Reduction based on minimal rational approximation”, Sci. Comput. Electr. Eng. 36.  
[ F. Nobile and DP, “Non-intrusive double-greedy parametric model reduction by interpolation of frequency-domain rational surrogates”, ESAIM:M2AN 55.  
2022 [ DP and F. Nobile, “A technique for non-intrusive greedy piecewise-rational model reduction of frequency response problems over wide frequency bands”, J. Math. Ind. 12.  
2023 [ F. Bonizzoni, DP, and M. Ruggeri, “Rational-approximation-based model order reduction of Helmholtz frequency response problems with adaptive finite element snapshots”, Math. Eng. 5.  
[ DP, “Adaptive approximation of nonlinear eigenproblems by minimal rational interpolation”, PAMM 22 (in press).

### Pending articles

- 2023 [ DP, M. Nonino, and I. Perugia, “Geometry-based approximation of waves in complex domains”, under review.

### Presentations at conferences

- 2019 [ DP, F. Nobile, F. Bonizzoni, and I. Perugia, “A technique for rational model order reduction of parametric problems lacking uniform inf-sup stability”, GAMM Annual Meeting 2019, Vienna (A).  
DP, F. Nobile, F. Bonizzoni, and I. Perugia, “A technique for rational model order reduction of parametric problems lacking uniform inf-sup stability”, ICIAM 2019, Valencia (E).
- [ DP and F. Nobile, “Interpolatory rational model order reduction of parametric problems lacking uniform inf-sup stability”, ENUMATH 2019, Egmond aan Zee (NL).
- 2021 [ DP, F. Nobile, and F. Bonizzoni, “Non-intrusive model reduction of parametric frequency response problems via minimal rational interpolation”, ICOSAHOM 2020/2021 (virtual), Vienna (A).
- [ DP and F. Nobile, “Non-intrusive model reduction of parametric frequency-response problems – with applications to UQ”, SIMAI 2020+2021, Parma (I).
- 2022 [ DP and F. Nobile, “Non-intrusive surrogate modeling of parametric frequency response problems – With applications in forward UQ”, SIAM UQ22 (virtual), Atlanta (Georgia, US).  
DP and F. Nobile, “Inexpensive surrogate modeling of frequency response problems by greedy minimal rational interpolation”, GAMM Annual Meeting 2022, Aachen (D).
- [ DP and F. Nobile, “Non-intrusive surrogate modeling of frequency response surfaces via locally adaptive sparse grids”, GIMC SIMAI Young 2022, Pavia (I).

### Posters

- 2018 [ F. Bonizzoni, I. Perugia, F. Nobile, and DP, “An efficient algorithm for Padé-type approximation of the frequency response for the Helmholtz problem”, MoRePaS IV, Nantes (F).
- [ F. Bonizzoni, I. Perugia, F. Nobile, and DP, “An efficient algorithm for Padé-type approximation of the frequency response for the Helmholtz problem”, Swiss Numerics Day 2018, Zurich (CH).
- 2020 [ DP and F. Nobile, “Frequency-domain non-intrusive greedy Model Order Reduction based on minimal rational approximation”, SCEE 2020, Eindhoven (NL).
- [ DP and F. Nobile, “Frequency-domain non-intrusive greedy Model Order Reduction based on minimal rational approximation”, MORSS 2020 (virtual), Lausanne (CH).
- 2022 [ DP and F. Nobile, “Non-intrusive adaptive surrogate modeling of parametric frequency-response problems”, MORE 2022, Berlin (D).

### Others

- 2018 [ DP, F. Nobile, F. Bonizzoni, and I. Perugia, “Fast Least-Squares Padé approximation of self-adjoint problems with meromorphic structure”, seminar, MATHICSE retreat, Sainte-Croix (CH).
- [ DP, F. Nobile, F. Bonizzoni, and I. Perugia, “Fast Least-Squares Padé approximation of self-adjoint problems with meromorphic structure”, workshop talk, DRWA, Alba di Canazei (I).
- 2019 [ DP and F. Nobile, “Polynomial approximation of resonance manifolds”, short seminar, MATH-ICSE retreat, Champéry (CH).
- 2020 [ DP, “Padé approximation: a quick overview”, seminar (virtual), CSQI talks, Lausanne (CH).  
DP, “From Padé approximation to rational interpolation”, seminar (virtual), CSQI talks, Lausanne (CH).  
DP, “Minimal rational approximation”, seminar (virtual), CSQI talks, Lausanne (CH).

- | DP, “Minimal rational approximation: a model reduction tool for parametrized PDEs with resonances”, seminar (virtual), PDE Afternoons, Vienna (A).
- 2021 | DP, “Matching-based pMOR for dynamical systems”, seminar (virtual), CSQI talks, Lausanne (CH).
- 2022 | DP, “Surrogate modeling of parametric frequency response problems via locally adaptive sparse grids”, workshop talk, “Approximation of high-dimensional parametric PDEs in forward UQ” ESI workshop, Vienna (A).
- | DP, “Can reliable surrogate models for frequency-domain problems be both non-intrusive and cheap to build?”, workshop talk, “UQ in kinetic and transport equations and in high-frequency wave propagation” ESI workshop, Vienna (A).

## Teaching experience

- 2017–2021 | As teaching assistant at EPFL (preparation of course and exercise material, preparation and grading of assignments and exams):
  - 2017 ( Analyse avancée I, BSc in Mathematics.
  - 2018 ( Analyse numérique, BSc in Mechanical Engineering.
  - 2018 ( Analyse fonctionnelle, BSc in Mathematics.
  - 2019 ( Introduction to partial differential equations, BSc in Mathematics.
  - 2021 ( Numerical analysis and computational mathematics, MSc in Computational Sciences and Engineering.
- 2019–2021 ( Parallel and high-performance computing, MSc in Computational Sciences and Engineering.
- 2022 | Invited lecturer for: Numerical methods for random PDEs and uncertainty, PhD course, EPFL.
- 2022 | As university assistant at U Vienna (charged with the organization of the whole course):
  - 2022 ( Exercises of Analysis and Linear Algebra I, BSc in Mathematics.

## Other service

- 2019 | Supervision of BSc thesis: “Approximation numérique du spectre des opérateurs elliptiques d’ordre deux” by T. Chanay, EPFL.
- 2020 | Conference organizer, Model Order Reduction Summer School 2020 (virtual event).
  - | Referee for scientific journals: Advances in Computational Mathematics.
- 2022 | Supervision of MSc project: “Minimal rational approximation for time-harmonic Maxwell’s equations” by F. Matti, EPFL.
  - | Referee for scientific journals: Journal of Computational Physics.

## Computer skills

- Advanced | Matlab, C/C++, OpenMP, MPI, Python, FreeFem++, L<sup>A</sup>T<sub>E</sub>X.
- Intermediate | CUDA, C#, HTML.
- Basic | R, OpenFOAM, Fluent, Fortran, Java.

## Languages

Italian:	Mother tongue	English:	Fluent
French:	Intermediate	Japanese:	Basic
German:	Basic	Spanish:	Basic
Swedish:	Basic		

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