

# 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 S.p.A., 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 [ *B.Sc. 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 [ *M.Sc. 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 [ *Ph.D. 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.

### Pending articles

- 2021 [ F. Bonizzoni, DP, and M. Ruggeri, “Rational-based model order reduction of Helmholtz frequency response problems with adaptive finite element snapshots”, 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 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).

### 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).

### 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).

### Teaching experience

- 2017 [ Analyse avancée I, Mathematics, EPFL.
  - 2018 [ Analyse numérique, Mechanical Engineering, EPFL.
  - [ Analyse fonctionnelle, Mathematics, EPFL.
  - 2019 [ Introduction to partial differential equations, Mathematics, EPFL.
  - 2021 [ Numerical analysis and computational mathematics, Computational Sciences, EPFL.
  - 2019–2021 [ Parallel and high-performance computing, Computational Sciences, EPFL.
- (Including preparation of course&exercise material, preparation and grading of assignments&exams.)

## Other service

- 2019 [ Supervision of B.Sc. 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 M.Sc. project: “Rational approximation for the frequency response of the time-harmonic Maxwell’s equations” by F. Matti, EPFL.

## Computer skills

- Advanced [ Matlab, C/C++, OpenMP, MPI, Python, FreeFem++,  $\LaTeX$ .
- Intermediate [ CUDA, C#, HTML.
- Basic [ R, OpenFOAM, Fluent, Fortran, Java.

## Languages

|          |              |           |        |
|----------|--------------|-----------|--------|
| Italian: | Mothertongue | English:  | Fluent |
| French:  | Intermediate | Japanese: | Basic  |
| German:  | Basic        | Spanish:  | Basic  |

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