

FEDERICO PICHI



PERSONAL INFORMATION

Born in Rome, Italy 23 February 1992

Ph.D. in **Mathematical Analysis, Modelling and Applications**

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website <https://fpichi.github.io>

POSITION

Current Position

Postdoctoral researcher at **EPFL** (École Polytechnique Fédérale de Lausanne) in the **MCSS** group of Prof. **Jan S. Hesthaven**.

Research Interests

Numerical analysis of bifurcating phenomena held by non-linear equations. Reduced order models in computational Continuum Mechanics, Fluid Dynamics and Quantum Mechanics with applications to Artificial Neural Networks, Optimal Control Problems and Fluid-Structure Interaction.

PUBLICATIONS

2021

- [9] [“An artificial neural network approach to bifurcating phenomena in computational fluid dynamics”](#)

Authors: F. PICHI, F. BALLARIN, G. ROZZA, J. S. HESTHAVEN.
In: [arXiv](#).

- [8] [“Model order reduction for bifurcating phenomena in fluid-structure interaction problems”](#)

Authors: M. KHAMLICH, F. PICHI, G. ROZZA.
In: [International Journal for Numerical Methods in Fluids](#), 2022.

2020

- [7] [“A successive partition method for the efficient evaluation of parametrized stability factors”](#)

Authors: F. BALLARIN, F. PICHI, G. ROZZA.
In: Preprint

- [6] [“Driving bifurcating parametrized nonlinear PDEs by optimal control strategies: application to Navier-Stokes equations and model reduction”](#)

Authors: F. PICHI, M. STRAZZULLO, F. BALLARIN, G. ROZZA.
In: [ESAIM: Mathematical Modelling and Numerical Analysis](#), 2022.

2019

- [5] [“Reduced order models for the buckling of hyperelastic beams.”](#)

Authors: F. PICHI, J. EFTANG, G. ROZZA, A. T. PATERA.
In: Report MIT-FVG “ROM2S”

- [4] [“Efficient computation of bifurcation diagrams with a deflated approach to reduced basis spectral element method”](#)

Authors: M. PINTORE, F. PICHI, M. HESS, G. ROZZA, C. CANUTO.
In: [Advances in Computational Mathematics](#), 47:1, 2021.

- [3] [“A Reduced Order technique to study bifurcating phenomena: application to the Gross-Pitaevskii equation”](#)

Authors: F. PICHI, A. QUAINI, G. ROZZA.
In: [SIAM Journal on Scientific Computing](#), 42:5, B1115-B1135, 2020.

- [2] “Reduced basis approaches for parametrized bifurcation problems held by non-linear von Kármán equations”
 Authors: F. PICHI, G. ROZZA.
 In: *Journal of Scientific Computing*, 10.1007/s10915-019-01003-3, 2019.
 2018
- [1] “Reduced Basis Approximation and A Posteriori Error Estimation: Applications to Elasticity Problems in Several Parametric Settings”
 Authors: D.B.P. HUYNH, F. PICHI and G. ROZZA
 In: *Numerical Methods for PDEs: State of the Art Techniques*, Springer International Publishing, Ch. 8, 203–247, 2018.

EDUCATION

Postdoc	2020-2021	SISSA-EPFL, Lausanne (Switzerland)
	CRUI GO for IT grant · mathLab-MCSS Project: <i>Reduced order methods for nonlinear PDEs enhanced by machine learning</i> PIs: Prof. Gianluigi ROZZA & Prof. Jan S. HESTHAVEN	
Visiting Student	2018-2019	MIT, Cambridge (USA)
	Massachusetts Institute of Technology · Computational Engineering Advisors: Prof. Anthony PATERA Project: ROM2S Reduced Order Methods at MIT and SISSA	
Ph.D. degree	2016-2020	SISSA, Trieste (Italy)
	Mathematical Analysis, Modelling and Applications · Mathematics Area Thesis: <i>Reduced order models for parametric bifurcation problems in nonlinear PDEs</i> Advisors: Prof. Gianluigi ROZZA & Dr. Francesco BALLARIN Final Grading <i>cum laude</i>	
Master degree	2014-2016	‘La Sapienza’ University, Rome (Italy)
	Applied Mathematics · Department of Mathematics Thesis: <i>Reduced order methods for parametric Von Kármán equations</i> Advisors: Prof. Maurizio FALCONE & Prof. Gianluigi ROZZA Final Grading <i>110/110 cum laude</i>	
Bachelor degree	2011-2014	‘La Sapienza’ University, Rome (Italy)
	Mathematics · Department of Mathematics Thesis: <i>Discontinuous differential equations in control theory</i> Advisor: Prof. Corrado MASCIA Final Grading <i>110/110 cum laude</i>	

OTHER INFORMATION

Teaching and Tasks	Courses
	<ul style="list-style-type: none"> ◦ ROM in bifurcating parametrised non-linear equations, SISSA, 2019. ◦ MATLAB, University of Trieste, 2019. ◦ <i>Computational Mechanics by Reduced Order Methods</i> [TA], SISSA, 2022. ◦ <i>Dynamics and bifurcation</i> [TA], EPFL, 2022. ◦ <i>Summer School on Reduced Order Methods in Computational Fluid Dynamics</i>. Invited lecturer, SISSA, 2022.
	Tutoring
	<ul style="list-style-type: none"> ◦ Internship project of Max Hirsch, <i>Physics informed reduced order models: reinforced neural networks for non-intrusive reduction</i>. Master degree in Mathematical Sciences, Carnegie Mellon University, Pennsylvania, (May 2022).

- Master thesis of Moaad Khamlich, *Reduced order models for bifurcating phenomena in Fluid-Structure Interaction problems*. Master degree in Mathematical Engineering, Politecnico di Milano, Italy, (Apr. 2021).
- Master thesis of Moreno Pintore, *Efficient Computation of Bifurcation Diagrams with Spectral Element Method and Reduced Order Models*. Master degree in Mathematical Engineering, Politecnico di Torino, Italy, (Oct. 2019).

Miscellanea

- President of [SISSA Siam Student Chapter](#) (2019-2020)
- Organizer of [SISSA SIAM Student Chapter Colloquia 2020](#), Virtual Event
- Reviewer: [SIAM Journal on Scientific Computing](#), [Advances in Computational Mathematics](#), [Journal of Scientific Computing](#), [Finite Elements in Analysis and Design](#), [International Journal of Bifurcation and Chaos](#), [AMS Math. Reviews](#), [Advances in Continuous and Discrete Models](#).

Awards and Funding

[2021 Fondazione CIME](#) · Grant for CIME Summer School: Model Order Reduction and Applications

[2021 GNCS-INDAM](#) · Grant for Coupled Problems 2021

[2021 CRUI project GO for IT](#) · Research grant between EPFL and SISSA: "Reduced order methods for nonlinear PDEs enhanced by machine learning"

[2020 ECCOMAS Scholarship](#) · Grant for WCCM-ECCOMAS Virtual Congress

[2019 Banco Santander Financial Support Program](#) · Grant for 9th International Congress on Industrial and Applied Mathematics ICIAM2019

[2018 MIT-Italy - FVG Project](#) · ROM2S Reduced Order Methods at MIT and SISSA

[2018 INDAM GNCS](#) · Tecniche di riduzione di modello per le applicazioni mediche

[2017 INDAM GNCS](#) · Tecniche di riduzione computazionale e applicazioni

[SISSA](#) · Master thesis fellowship for pre-graduate students

[Sapienza University](#) · Excellence course for Master degree in Applied Mathematics 2014-2016

[Sapienza University](#) · Excellence course for Bachelor degree in Mathematics 2011-2014

Conferences and Workshops

[MORE](#) (talk), [ROM in CFD](#) (talk), [ECCOMAS2022](#) (talk), [RAMSES2021](#) (talk), [MMLDT-CSET2021](#) (talk), [CIME Summer School 2021](#) (talk), [Coupled 2021](#) (talk), [FEniCS 2021](#) (talk), [SIAM CSE 2021](#) (talk), [WCCM-ECCOMAS 2020](#) (talk), [MORSS 2020](#) (talk), [SAMM 2020](#) (poster), [UMI 2019](#) (talk), [ICIAM 2019](#) (talk), [ROM in CFD](#) (poster), [CIME-EMS Summer School](#), [ICOSAHOM 2018](#) (talk), [MoRePaS 2018](#) (poster), [QUIET 2017](#), [FEF 2017](#), [EU-MORNET](#).

July 16, 2022