

Anna Ivagnes

Curriculum Vitae

Permanent Address: Via Sebastiano Natali, 8, Gallipoli (LE), Italy
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Experience

Vocational

Oct 2026–Present **Post-doctoral researcher**, *SISSA (International School for Advanced Studies) mathLab*, Trieste, Italy.
Research contract under the FIS (Fondo Italiano per la Scienza) project ROSA (Reduced Order and Surrogate Methods for Advanced Applications) on Scientific machine learning and surrogate models for computational fluid dynamics.

Oct 2022–Sep 2026 **PhD Student in Mathematical Analysis, Modeling and Applications**, *SISSA (International School for Advanced Studies) mathLab*, Trieste, Italy.
Topics of interest:
- Data-driven closure techniques for intrusive reduced order models;
- Space-dependent aggregation methods for data-driven surrogate models;
- Convolutional-based architectures for the nonlinear dimensionality reduction of full order operators;
- Filtering approaches for the incompressible Navier–Stokes equations.

PhD Advisor: Prof. Gianluigi Rozza,
International School of Advanced Studies (SISSA),
Via Bonomea, 265, Trieste, Italy,
gianluigi.rozza@sissa.it

PhD Co-advisor: Prof. Giovanni Stabile,
Biorobotics Institute, Sant'Anna School of Advanced Studies,
Viale Rinaldo Piaggio, 34, Pontedera, Pisa, Italy,
giovanni.stabile@santannapisa.it

Oct 2025 **Two-weeks vising period**, *DISMA, Politecnico di Torino*, Torino, Italy.
Scientific collaboration with Dr. Maria Strazzullo on reinforcement-learning guided filtering approaches for the stabilization of convection-dominated flows.

May–July 2025 **Three-months Internship**, *Centrum Wiskunde & Informatica (CWI)*, Amsterdam, The Netherlands.
Scientific collaboration with Prof. Benjamin Sanderse. Topics of the project:
- Simulation of turbulent flows on staggered grids;
- Development of an Evolve-Filter-Relax approach, where the filter acts in the frequencies domain;
- Energy-conserving (and in general) structure-preserving filtering.

Oct–Nov 2023 **One-month Secondment**, *Virginia Tech*, Virginia, USA.
Scientific collaboration with Prof. Traian Iliescu in the context of the ARIA (Accurate ROMs in Industry and Applications) project. Topics of the secondment:
- Simulation of turbulent flows benchmark with Finite Elements;
- Implementation of an optimized version of the Evolve-Filter-Relax formulation;
- Investigation of different parameters' optimization strategies.

Sep 2021–Sep 2022 **Research Fellow**, *SISSA (International School for Advanced Studies) mathLab*, Trieste, Italy.
Fellowship holder at SISSA in cooperation with Fincantieri S.P.A.
Numerical simulation and mathematical modelling of new hydrodynamic shapes for the reduction of resistance, noise and pollution for the immersed part of cruise ships.
Keywords of the project:
- Shape optimization pipeline using efficient surrogate models;
- High-fidelity simulation with the open-source software OpenFOAM;
- Development of data-driven Reduced Order Models for the reduction of the computational effort.

Mar 2021–Jul 2021 **Pre-degree internship**, *SISSA (International School for Advanced Studies) mathLab*, Trieste, Italy.
Fellowship holder in the framework of the project ERC AROMA-CFD (European Research Council: Advanced Reduced Order Methods with Applications in Computational Fluid Dynamics). Development of data-driven techniques combined with Reduced Order Methods, applied to the study of turbulent flows to improve the reconstruction of the velocity and pressure fields.

Education

Sep 2019–Jul 2021 **Master degree in Mathematical Engineering**, *Politecnico of Torino*, Italy.
Final mark: 110/110 with honours

Sep 2016–Jul 2019 **Bachelor degree in Industrial Engineering**, *University of Salento*, Italy.
Final mark: 110/110 with honours

Sep 2011–Jul 2016 **Scientific High School**, *Liceo Quinto Ennio, Gallipoli (LE)*, Italy.
Final mark: 100/100 with honours

Supervised projects

2026 Master Thesis of Maria Garcia de la Santa Vinuela (Universidad Politécnica de Madrid, Spain). Title: "*Filtering and regularization strategies for turbulent flows.*"

2025 Master Thesis of Piero Zappi (University of Trieste, Scientific and Data Intensive Computing, Italy). Title: "*Aggregation Strategies of High-Fidelity and Reduced Order Models for Turbulent Flows*"

2024 Master Thesis of Gabriele Codega (University of Trieste, Data Science and Scientific Computing, Italy). Title: "*Machine learning-based Closures for Non-intrusive Reduced Order Models*"

Other Academic Activities

2027-2030* Member of the European Mathematical Society Young Academy (EMYA)

Jan 2026-Present President of Young-SIMAI (Y-SIMAI)

Sep 2025-Jan 2026 Tutoring for the SISSA PhD Course in *Applied Mathematics: Numerical Analysis and Scientific Computing*

May 2025 Organization of Young Mathematicians in Model Order Reduction (YMMOR) conference, SISSA, Trieste. Website: mathlab.github.io/ymmor2025

Sep 2023-Sep 2025 SISSA SIAM Student Chapter President

2023-2025 Organization of SISSA Women In Mathematics

Sep 2022-Jul 2023 SISSA SIAM Student Chapter Vice-President

Publications

Preprint, 2026 *A Nonlinear Physics-based Reduced Order Model with Convolutional-based Operator Compression*,
A. Ivagnes, G. Stabile, G. Rozza
arXiv: 2609.24300

Preprint, 2026 *Efficient and Accurate Surrogate Modeling of Turbulent Flows via Space-Dependent Aggregation and Reduced Order Models*,
P. Zappi, A. Ivagnes, N. Tonicello, G. Rozza
arXiv: 2603.15816

Preprint, 2026 *Reinforcement Learning-Based Filters for Convection-Dominated Flows: Reference-Free and Reference-Guided Training*,
A. Ivagnes, M. Strazzullo, G. Rozza
arXiv: 2603.02086

2026 *StabOp: A Data-Driven Stabilization Operator for Reduced Order Modeling*,
P. H. Tsai, A. Ivagnes, A. Quaini, T. Iliescu, G. Rozza,
Computer Methods in Applied Mechanics and Engineering, 457, 118990,
arXiv: 2602.07745, doi: 10.1016/j.cma.2026.118990

2026 *A new data-driven energy-stable Evolve-Filter-Relax model for turbulent flow simulation*,
A. Ivagnes, T. V. Gastelen, S. D. Agdestein, B. Sanderse, G. Stabile, G. Rozza,
Computer Methods in Applied Mechanics and Engineering, 450, 118654,
arXiv: 2507.17423, doi: 10.1016/j.cma.2025.118654

2026 *Machine Learning-based quadratic closures for non-intrusive Reduced Order Models*,
G. Codega, A. Ivagnes, N. Demo, G. Rozza,
SIAM Journal on Scientific Computing 48.3: C505-C525,
arXiv: 2506.09830, doi: 10.1137/25M1766759

2026 *Data-driven Closure Strategies for Parametrized Reduced Order Models via Deep Operator Networks*,
A. Ivagnes, G. Stabile, G. Rozza,
Computer Methods in Applied Mechanics and Engineering, 455, 118900,
arXiv: 2505.17305, doi: 10.1016/j.cma.2026.118900

2025 *Data-driven adaptive Evolve-Filter-Relax regularization for convection-dominated flows*,
A. Ivagnes, M. Strazzullo, M. Girfoglio, T. Iliescu, G. Rozza,
International Journal for Numerical Methods in Engineering, 126.9: e70042.
arXiv: 2501.03933, doi: 10.1002/nme.70042

Preprint, 2024 *Parametric Intrusive Reduced Order Models enhanced with Machine Learning Correction Terms*,
A. Ivagnes, G. Stabile, G. Rozza
arXiv: 2406.04169

2024 *Enhancing nonintrusive reduced-order models with space-dependent aggregation methods* ,
A. Ivagnes, N. Tonicello, P. Cinnella, G. Rozza,
Acta Mechanica, 1-30.
arXiv: 2403.05710, doi: 10.1007/s00707-024-04007-9

2024 *A shape optimization pipeline for marine propellers by means of reduced order modeling techniques*,
A. Ivagnes, N. Demo, G. Rozza,
International Journal for Numerical Methods in Engineering, 125.7: e7426.
arXiv: 2305.07515, doi: 10.1002/nme.7426

2023 *Physics-informed neural networks for advanced modeling*,
D. Coscia, A. Ivagnes, N. Demo, G. Rozza,
Journal of Open Source Software 8.87: 5352.
doi: 10.21105/joss.05352

2023 *Hybrid Data-Driven Closure Strategies for Reduced Order Modeling*,
A. Ivagnes, G. Stabile, A. Mola, G. Rozza, T. Iliescu,
Applied Mathematics and Computation, 448: 127920.
arXiv: 2207.10531, doi: 10.1016/j.amc.2023.127920

2023 *Pressure Data-driven Variational Multiscale Reduced Order Models*,
A. Ivagnes, G. Stabile, A. Mola, G. Rozza, T. Iliescu,
Journal of Computational Physics, 476: 111904.
arXiv: 2205.15118, doi: 10.1016/j.jcp.2022.111904

2023 *Towards a machine learning pipeline in reduced order modelling for inverse problems: neural networks for boundary parametrization, dimensionality reduction and solution manifold approximation*,
A. Ivagnes, N. Demo, G. Rozza,
Journal of Scientific Computing, 95.1: 23.
arXiv: 2210.14764, doi: 10.1007/s10915-023-02142-4

Presentations

Nov 2026* Invited talk at **Low rank and MOR for PDEs** workshop, Rome (Italy).

Nov 2026* Talk at **MORE** conference, Milan (Italy).
Title: *A data-driven energy-stable Evolve-Filter-Relax model for turbulent flow simulations*

Jul 2026 Talk at **ECCOMAS WCCM** conference, Munich (Germany).
Title: *Learning When and How to Filter: Reinforcement Learning for Convection-Dominated Flows*

Jun 2026 Talk at **GIMC-SIMAI Young** conference, Pisa (Italy).
Title: *StabOp: a Data-driven Stabilization Operator for Reduced Order Modeling*

Apr 2026 Talk at **SPARCL** workshop, Paris (France).
Title: *A new data-driven energy-stable Evolve-Filter-Relax model for turbulent flow simulation*

Sep 2025 Talk at **SIMAI** conference, Trieste (Italy).
Title: *Data-driven Closure Strategies for Parametrized Reduced Order Models via Deep Operator Networks*

Mar 2025 Talk at **SIAM CSE**, Fort Worth, Texas (USA).
Title: *Nonlinear Reduction of Partial Differential Operators Via Convolutional Architectures*

Feb 2025 Talk at **GNCS-SIAM Chapters Meeting**, Pavia, Italy.
Title: *Parametric Intrusive Reduced Order Models enhanced with Machine Learning Correction Terms*

Jul 2024 Poster presentation at **Summer school on Numerical Analysis**, Palaiseau, France.
Title: *Parametric Intrusive Reduced Order Models enhanced with Machine Learning Correction Terms*

Jun 2024 Talk at **ECCOMAS Congress on Computational Methods in Applied Sciences and Engineering** conference, Lisbon, Portugal.
Title: *Regularization Techniques for Data-driven Reduced Order Models*

Mar 2024 Talk at **Young Mathematicians in Model Order Reduction (YMMOR)**, Stuttgart, Germany.
Title: *Enhancing Non-intrusive Reduced Order Models with Space-dependent Aggregation Methods*

Feb 2024 Talk at **SIAM UQ** conference, Trieste, Italy.
Title: *Hybrid Data-driven Strategies for Parametric Reduced Order Modeling*

Jun-Jul 2023 Talk at **Computational Methods in Marine Engineering (MARINE)**, Madrid, Spain.
Title: *Non-intrusive Reduced Order Modeling to Accelerate Design and Optimization Processes.*

Apr 2023 Talk at **Computational Fluids Conference (CFC)**, Cannes, France.
Title: *Data Enhanced Reduced Order Methods for Turbulent Flows.*

Sep 2022 Poster presentation at **Model Reduction and Surrogate Modeling (MORE)** conference, Berlin, Germany.
Title: *Data Enhanced Reduced Order Methods for Turbulent Flows.*

Jul 2022 Lecture at Summer School on **Reduced Order Methods in Computational Fluid Dynamics**, SISSA, Trieste, Italy.
Title: *Data enhanced reduced order models for turbulent flows.*

Dec 2021 Poster presentation at **RAMSES: Reduced order models; Approximation theory; Machine learning; Surrogates, Emulators and Simulators** conference, SISSA, Trieste, Italy.
Title: *Data Enhanced Reduced Order Methods for Turbulent Flows.*

Awards

2024 **SIAM Student Chapter Certificate of Recognition**

2023 **Best Student Presentation**, CFC (Computational Fluids Conference), Cannes, France

Computer skills

Basic Ansys Fluent, AutoCad, COMSOL Multiphysics, Javascript

Intermediate Matlab, PYTHON, Linux, C++, Julia

Advanced LaTeX, OpenFOAM

Languages

Italian **Mothertongue**

English **Upper-Intermediate** *FCE - Cambridge Certification*

Trieste, 21^{st} October 2026