

Personal data

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Research and Education

- 2018-2021** PhD candidate in Mathematical Analysis, Modelling, and Applications at SISSA, International School for Advanced Studies, Mathematics Area, mathLab. Industrial Ph.D. grant financed by Fincantieri S.p.A.. Advisor Prof. Gianluigi Rozza.
- 2015-2018** Assistant Researcher at SISSA, International School for Advanced Studies, Mathematics Area, mathLab. Supervisor Prof. Gianluigi Rozza.
- 2014-2015** Master in High Performance Computing, International School for Advanced Studies (SISSA) and ICTP, Trieste, Italy. Advisor Prof. Luca Heltai.
- 2010-2014** M.Sc. in Mathematics, Università degli studi di Milano, Italy, 104/110, (6 months ERASMUS LLP exchange program at Technische Universität Kaiserslautern, Germany). Advisor Prof. Lourenco Beirao da Veiga, co-advisor Prof. Luca Heltai.
- 2006-2010** B.Sc. in Mathematics, Università degli studi di Pavia, Italy, 102/110. Advisor Prof. Daniele Boffi, co-advisor Prof. Luca Heltai.

Awards and Funding

- A1.** Winner of DSWeb 2019 Software Contest (webpage) – Tutorials on Dynamical Systems Software - Junior Faculty Category - PyDMD Package, in collaboration with N. Demo. Announced at SIAM Conference on Applications of Dynamical Systems in Snowbird.
- A2.** 2018–2020 MISTI MIT-Italy FVG Project: Multi-disciplinary Ship Design by Reduced Order Models and Machine Learning at MIT and SISSA.
- A3.** Ph.D scholarship at SISSA, financed by Fincantieri S.p.A..
- A4.** Master in HPC scholarship at SISSA & ICTP, financed by Nvidia.
- A5.** SISSA: Master thesis fellowship for pre-graduate students (2014).

Research Projects I have been involved in

- R1. H2020 ERC CoG 2015 AROMA-CFD** project 681447 “Advanced Reduced Order Methods with Applications in Computational Fluid Dynamics” P.I. Gianluigi Rozza, supported by European Union Funding for Research and Innovation — Horizon 2020 Program — in the framework of European Research Council Executive Agency.
- R2. SOPHYA**, “Seakeeping Of Planing Hull YAchts”, supported by Regione FVG, POR-FESR 2014-2020, Piano Operativo Regionale Fondo Europeo per lo Sviluppo Regionale.
- R3. PRELICA**, “Advanced methodologies for hydro-acoustic design of naval propulsion”, supported by Regione FVG, POR-FESR 2014-2020, Piano Operativo Regionale Fondo Europeo per lo Sviluppo Regionale.
- R4. HEaD - Higher Education and Development**, “Shape optimization of bow and stern by mean of parametric algorithms and reduced order methods” in collaboration with Fincantieri S.p.A., supported by Regione FVG, European Social Fund FSE 2014-2020.
- R5. INdAM GNCS 2019**: “Advanced intrusive and non-intrusive model order reduction techniques and applications”.
- R6. INdAM GNCS 2018**: “Tecniche di riduzione di modello per le applicazioni mediche”.
- R7. TRIM-OPT**, Cluster Trasporti Italia 2020, main partner CNR-INSEAN.

List of Publications

According to **Scopus**: 11 indexed documents, 65 citations, H-Index 6. Author webpage.

Publications in International Journals

- J1.** M. Tezzele, N. Demo, G. Stabile, A. Mola, and G. Rozza. Enhancing CFD predictions in shape design problems by model and parameter space reduction. *Advanced Modeling and Simulation in Engineering Sciences*, 7(40), 2020
- J2.** F. Romor, M. Tezzele, A. Lario, and G. Rozza. Kernel-based Active Subspaces with application to CFD parametric problems using Discontinuous Galerkin method. *arXiv preprint arXiv:2008.12083*, Submitted, 2020
- J3.** M. Gadalla, M. Cianferra, M. Tezzele, G. Stabile, A. Mola, and G. Rozza. On the comparison of LES data-driven reduced order approaches for hydroacoustic analysis. *arXiv preprint arXiv:2006.14428*, Submitted, 2020
- J4.** N. Demo, M. Tezzele, and G. Rozza. A supervised learning approach involving active subspaces for an efficient genetic algorithm in high-dimensional optimization problems. *arXiv preprint arXiv:2006.07282*, Submitted, 2020
- J5.** M. Tezzele, F. Salmoiraghi, A. Mola, and G. Rozza. Dimension reduction in heterogeneous parametric spaces with application to naval engineering shape design problems. *Advanced Modeling and Simulation in Engineering Sciences*, 5(1):25, Sep 2018

Conference Proceedings/Papers

- C1.** F. Romor, M. Tezzele, and G. Rozza. Multi-fidelity data fusion for the approximation of scalar functions with low intrinsic dimensionality through active subspaces. In *Proceedings in Applied Mathematics & Mechanics*, 2020

- C2.** M. Tezzele, N. Demo, and G. Rozza. Shape optimization through proper orthogonal decomposition with interpolation and dynamic mode decomposition enhanced by active subspaces. In R. Bensow and J. Ringsberg, editors, *Proceedings of MARINE 2019: VIII International Conference on Computational Methods in Marine Engineering*, pages 122–133, 2019
- C3.** N. Demo, M. Tezzele, A. Mola, and G. Rozza. A complete data-driven framework for the efficient solution of parametric shape design and optimisation in naval engineering problems. In R. Bensow and J. Ringsberg, editors, *Proceedings of MARINE 2019: VIII International Conference on Computational Methods in Marine Engineering*, pages 111–121, 2019
- C4.** A. Mola, M. Tezzele, M. Gadalla, F. Valdenazzi, D. Grassi, R. Padovan, and G. Rozza. Efficient reduction in shape parameter space dimension for ship propeller blade design. In R. Bensow and J. Ringsberg, editors, *Proceedings of MARINE 2019: VIII International Conference on Computational Methods in Marine Engineering*, pages 201–212, 2019
- C5.** G. Rozza, M. H. Malik, N. Demo, M. Tezzele, M. Girfoglio, G. Stabile, and A. Mola. Advances in Reduced Order Methods for Parametric Industrial Problems in Computational Fluid Dynamics. In R. Owen, R. de Borst, J. Reese, and P. Chris, editors, *ECCOMAS ECFD 7 - Proceedings of 6th European Conference on Computational Mechanics (ECCM 6) and 7th European Conference on Computational Fluid Dynamics (ECFD 7)*, pages 59–76, Glasgow, UK, 2018
- C6.** N. Demo, M. Tezzele, G. Gustin, G. Lavini, and G. Rozza. Shape optimization by means of proper orthogonal decomposition and dynamic mode decomposition. In *Technology and Science for the Ships of the Future: Proceedings of NAV 2018: 19th International Conference on Ship & Maritime Research*, pages 212–219. IOS Press, 2018
- C7.** M. Tezzele, N. Demo, M. Gadalla, A. Mola, and G. Rozza. Model order reduction by means of active subspaces and dynamic mode decomposition for parametric hull shape design hydrodynamics. In *Technology and Science for the Ships of the Future: Proceedings of NAV 2018: 19th International Conference on Ship & Maritime Research*, pages 569–576. IOS Press, 2018
- C8.** D. Cangelosi, A. Bonvicini, M. Nardo, A. Mola, A. Marchese, M. Tezzele, and G. Rozza. SRtP 2.0 — The Evolution of the Safe Return to Port Concept. In *Technology and Science for the Ships of the Future: Proceedings of NAV 2018: 19th International Conference on Ship & Maritime Research*, pages 665 – 672. IOS Press, 2018
- C9.** N. Demo, M. Tezzele, A. Mola, and G. Rozza. An efficient shape parametrisation by free-form deformation enhanced by active subspace for hull hydrodynamic ship design problems in open source environment. In *Proceedings of ISOPE 2018: The 28th International Ocean and Polar Engineering Conference*, volume 3, pages 565–572, 2018
- C10.** F. Salmoiraghi, F. Ballarin, G. Corsi, A. Mola, M. Tezzele, and G. Rozza. Advances in geometrical parametrization and reduced order models and methods for computational fluid dynamics problems in applied sciences and engineering: Overview and perspectives. *ECCOMAS Congress 2016 - Proceedings of the 7th European Congress on Computational Methods in Applied Sciences and Engineering*, 1:1013–1031, 2016

Proceedings in Invited Books as Chapters, Special Volumes and Chapters in Books

- I1.** F. Garotta, N. Demo, M. Tezzele, M. Carraturo, A. Realì, and G. Rozza. Reduced Order Isogeometric Analysis Approach for PDEs in Parametrized Domains. In M. D’Elia, M. Gunzburger, and G. Rozza, editors, *Quantification of Uncertainty: Improving Efficiency and Technology: QUIET selected contributions*, volume 137 of *Lecture Notes in Computational Science and Engineering*, pages 153–170. Springer International Publishing, Cham, 2020

- I2.** G. Rozza, M. W. Hess, G. Stabile, M. Tezzele, and F. Ballarin. Basic Ideas and Tools for Projection-Based Model Reduction of Parametric Partial Differential Equations. In P. Benner, S. Grivet-Talocia, A. Quarteroni, G. Rozza, W. H. A. Schilders, and L. M. Silveira, editors, *Handbook on Model Order Reduction*, volume 2, chapter 1. De Gruyter, In Press, 2020
- I3.** M. Tezzele, N. Demo, A. Mola, and G. Rozza. An integrated data-driven computational pipeline with model order reduction for industrial and applied mathematics. *Special Volume ECMI, In Press*, 2020
- I4.** N. Demo, M. Tezzele, and G. Rozza. A non-intrusive approach for reconstruction of POD modal coefficients through active subspaces. *Comptes Rendus Mécanique de l'Académie des Sciences, DataBEST 2019 Special Issue*, 347(11):873–881, November 2019
- I5.** M. Tezzele, F. Ballarin, and G. Rozza. Combined parameter and model reduction of cardiovascular problems by means of active subspaces and POD-Galerkin methods. In D. Boffi, L. F. Pavarino, G. Rozza, S. Scacchi, and C. Vergara, editors, *Mathematical and Numerical Modeling of the Cardiovascular System and Applications*, volume 16 of *SEMA-SIMAI Series*, pages 185–207. Springer International Publishing, 2018

Software Papers

- S1.** F. Romor, M. Tezzele, and G. Rozza. ATHENA: Advanced Techniques for High dimensional parameter spaces to Enhance Numerical Analysis. *Submitted*, 2020
- S2.** M. Gadalla, M. Tezzele, A. Mola, and G. Rozza. BladeX: Python Blade Morphing. *The Journal of Open Source Software*, 4(34):1203, 2019
- S3.** N. Demo, M. Tezzele, and G. Rozza. PyDMD: Python Dynamic Mode Decomposition. *The Journal of Open Source Software*, 3(22):530, 2018
- S4.** N. Demo, M. Tezzele, and G. Rozza. EZyRB: Easy Reduced Basis method. *The Journal of Open Source Software*, 3(24):661, 2018

Conferences and Workshops

- C1. CSE 2021** (talk): SIAM Conference on Computational Science and Engineering, Virtual Conference (originally scheduled in Fort Worth, Texas, U.S.) 1–5 March 2021.
- C2. WCCM ECCOMAS 2020** (talk): Virtual Congress (originally scheduled in Paris, France) 11–15 January 2021.
- C3. ROMs in CFD 2019** (co-lecturer): Summer School on Reduced Order Methods in Computational Fluid Dynamics, 8–12 July 2019, SISSA, Trieste, Italy.
- C4. MARINE 2019** (talk): VIII International Conference on Computational Methods in Marine Engineering, 13–15 May 2019, Gothenburg, Sweden.
- C5. NAV 2018** (talk): 19th International Conference on Ship & Maritime Research, 20–22 June 2018, Trieste, Italy.
- C6. MoRePaS 2018** (poster): Model Reduction of Parametrized Systems IV, 10–13 April 2018, Nantes, France.
- C7. QUIET 2017** (poster): Quantification of Uncertainty: Improving Efficiency and Technology, 18–21 July 2017, Trieste, Italy.
- C8. MARS42 2017**, Summer Entrepreneurship School, 10–23 July 2017, Trieste, Italy.
- C9. ADMOS 2017** (talk): International Conference on Adaptive Modeling and Simulations, 26–28 June 2017, Verbania, Italy.

- C10. ME3 Conference at Institut Henri-Poincaré** (poster): Recent developments in numerical methods for model reduction, 7–10 November 2016, Paris, France.
- C11. Introductory School at IESC**: Numerical methods for PDEs, 5–9 September 2016, Cargese, France.
- C12. COST EU-MORNET** (talk): Reduced Order Methods in Computational Fluid Dynamics: state of the art and perspectives, 22–23 February 2016, SISSA, Trieste, Italy.

Software Libraries

- L1. PyDMD**: Python Dynamic Mode Decomposition. N. Demo, M. Tezzele, G. Rozza. (webpage | docs | DOI). Winner of DSWeb 2019 Software Contest.
- L2. PyGeM**: Python Geometrical Morphing. N. Demo, M. Tezzele, A. Mola, G. Rozza. (webpage | docs).
- L3. EZyRB**: Easy Reduced Basis method. N. Demo, M. Tezzele, G. Rozza. (webpage | docs | DOI).
- L4. BladeX**: Python Blade Morphing. M. Gadalla, M. Tezzele, A. Mola, G. Rozza. (webpage | docs | DOI).
- L5. ATHENA**: Advanced Techniques for High dimensional parameter spaces to Enhance Numerical Analysis. F. Romor, M. Tezzele, G. Rozza. (webpage | docs).

Minisymposia co-organizer

- M1. MARINE 2021**: IX International Conference on Computational Methods in Marine Engineering, 2–4 June 2021, Edinburgh, Scotland. Minisymposium titled: “Model order reduction methods in marine engineering”.
- M2. SIMAI 2020**: Bi-annual Congress of the Italian Society of Industrial and Applied Mathematics, 30 August – 3 September 2021, Parma, Italy. Minisymposium titled: “Advanced Computational Fluid Dynamics and Applications (part I and II)”.

Master Theses as co-advisor

- T1. E. Donadini**. Master Thesis, University of Trieste, Italy, 2020.
- T2. F. Romor**. Master Thesis: Reduction in Parameter Space for Problems approximated by Discontinuous-Galerkin Method in Computational Fluid Dynamics, University of Trieste, Italy, 2019.
- T3. A. Maurizio**. Master in HPC Thesis: Representation of distribution networks of ships using graph-theory, SISSA & ICTP, Trieste, Italy, 2018.
- T4. F. Garotta**. Master Thesis: Reduced Order Isogeometric Analysis approach for PDEs in parametrized domains, University of Pavia, Italy, 2018.