Eleonora Denich

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Degrees

- March 2024-Present: Postdoctoral Researcher at the Department of Mathematics, Informatics and Geophysics, University of Trieste (Italy).
  Project title: "Numerical methods for electromagnetic, geoelectric and seismic inversion".

- November 2019 - March 2023: *Ph.D in Earth Science, Fluid-Dynamics, and Mathematics. Interactions and Methods.* University of Trieste, Italy.
  Supervisor: Prof. P. Novati, University of Trieste, Italy.
  Co-supervisor: S. Picotti, National Institute of Oceanography and Applied Geophysics (OGS), 34010 Sgonico, Trieste, Italy.
  Project supported by CINECA under HPC-TRES program award number 2019-05
  Thesis: *Numerical methods for electromagnetic inversion* (discussed on March 23, 2023 at the University of Trieste).
  Reviewers: F. Monteiro Santos, IDL - University Lisbon and O. Lakkis, University of Sussex.

- October 2019: *Master Degree in Mathematics* (110L), University of Trieste, Italy
  Thesis: *Quasi-Newton methods for minimization problems.*
  Supervisor: Prof. P. Novati, University of Trieste, Italy.

Publications

12 publications ISI with Impact Factor, 26 total citations.

1. A. Vesnaver, L. Baradello, E. Denich, *Weak Underwater Signals' Detection by the Unwrapped Instantaneous Phase*, Journal of Marine Science and Engineering, (2025), **13(5)**, 907.

2. E. Denich, P. Novati, *On the computation of the Mittag-Leffler function of fractional powers of accretive operators*, Fractional Calculus and Applied Analysis, (2024), **27(6)**, 2964–2985.

3. E. Denich, P. Novati, *A sinc rule for the Hankel transform*, Journal of Scientific Computing, (2024), **100**, 23.

4. E. Denich, P. Novati, *Some notes on the trapezoidal rule for Fourier type integrals*, Applied Numerical Mathematics, (2024), **198**, 160-175.

5. E. Denich, P. Novati, *Numerical quadrature for integrals involving oscillating functions*, Journal of Approximation Software, (2024), **1**,
   https://ojs.unito.it/index.php/JAS/article/view/10097/8890.

6. E. Denich, *Error estimates for a Gaussian rule involving Bessel functions*, Journal of Computational and Applied Mathematics, (2024), **436**, 115448.

7. E. Denich, P. Novati, *Gaussian rule for integrals involving Bessel functions*, BIT Numerical Mathematics, (2023), **63**, 53.

8. E. Denich, P. Novati, S. Picotti *A fast and accurate numerical approach for electromagnetic inversion*, Journal of Computational Physics, (2023), **475**, 111846.

9. E. Denich, L. G. Dolce, P. Novati, *A Gauss Laguerre approach for the resolvent of fractional powers*, Electronic Transactions on Numerical Analysis, (2023), **58**, 517-537.

10. E. Denich, P. Novati, *A fast and simple algorithm for the computation of the Lerch transcendent*, Numerical Algorithms, (2023).

11. E. Denich, P. Novati, *A Gaussian Method for the Square Root of Accretive Operators*, Computational Methods in Applied Mathematics, (2022), **23**(1), 127-143.

12. E. Denich, A. Vesnaver, L. Baradello, *Amplitude Recovery and Deconvolution of Chirp and Boomer Data for Marine Geology and Offshore Engineering*, Energies, (2021) **14**(18), 5704.

Accepted manuscripts and preprints

1. E. Denich, *Asymptotic estimates of the error bound for Gauss-Radau quadratures*, Electronic Transactions on Numerical Analysis, **accepted for publication**.

2. E. Denich, P. Novati, *Error analysis of Gauss quadrature approximation to hypergeometric functions*, **submitted**, DOI: 10.13140/RG.2.2.30832.32005

3. E. Denich, P. Novati, S. Picotti, *A numerical strategy for electromagnetic inversion*, **submitted**, DOI: 10.13140/RG.2.2.17410.54725

Presentations and seminars

- SIMAI Conference 2025 "Società Italiana di Matematica Applicata e Industriale, Trieste, Italy, September 1-5, 2025, *A Gaussian method for the square root of accretive operators.*

- Workshop Software for Approximation SA2025, Torino, Italy, February 5-7, 2025, *Error analysis of the Gauss-Radau-Jacobi rule for meromorphic functions.*

- NAMAS Conference 2024 "Numerical Analysis & Modelling in Applied Sciences", Gaeta, Italy, September 16-20, 2024, *A numerical strategy for electromagnetic inversion.*

- Approximation Theory and Special Functions, ATSF 2024 Conference - 8th Series, Ankara, Turkey, September 4-7, 2024, *Construction and Error Analysis of a Gaussian Rule for Integrals Involving Bessel Functions.*

- 12th IFAC Conference on Fractional Differentiation and its Applications, Bordeaux, France, July 9-12, 2024, *Numerical Evaluation of the Mittag-Leffler Function of Operators.*

- Seminar "Complementi di Analisi Numerica" for the course "Meccanica computazionale per l'ingegneria navale" of the Master degree in Marine Engineering of the University of Trieste, April, 2023.

- ESFM Presentation day, February 22, 2023, University of Trieste, *Numerical methods for electromagnetic inversion.*

- 5th HPC-TRES Workshop, January 24, 2023, *An optimization strategy for electromagnetic inversion.*

- FAATNA 20>22, Matera, Italy, July 5-8, 2022, *Gaussian rule for integrals involving Bessel functions.*

- ESFM Presentation days, February 22-24, 2022, University of Trieste, *Numerical approaches to integral solutions for magnetic dipoles.*

- 2021 International School on Inverse Problems in Geophysics on the shore of the Lario Lake (online event), September 1, 2021, *Numerical approaches to integral solutions for magnetic dipoles.*

- 4th HPC-TRES Workshop, December 2, 2021, *Numerical methods for electromagnetic inversion.*

- 3rd HPC-TRES Workshop, December 10-11, 2020, *Electromagnetic inversion under the Low Induction Number approximation.*

- ESFM Presentation days, February 23-25, 2021, University of Trieste, *Electromagnetic inversion under the Low Induction Number approximation.*

- 2nd HPC-TRES Workshop, Trieste, November 18-19, 2019, *Numerical methods for Full Waveform Inversion. Analysis and implementation.*

Conferences / Workshops / International Schools

- Workshop Software for Approximation SA2025, Torino, Italy, February 5-7, 2025.

- NAMAS Conference 2024 "Numerical Analysis & Modelling in Applied Sciences", Gaeta, Italy, September 16-20, 2024.

- Approximation Theory and Special Functions, ATSF 2024 Conference - 8th Series, Ankara, Turkey, September 4-7, 2024.

- 12th IFAC Conference on Fractional Differentiation and its Applications, Bordeaux, France, July 9-12, 2024.

- 5th HPC-TRES Workshop, January 24, 2021, (invited).

- FAATNA 20>22 Functional Analysis, Approximation Theory and Numerical Analysis, Matera, Italy, July 5-8, 2022.

- 2021 International School on Inverse Problems in Geophysics on the shore of the Lario Lake (online event), August 30 - September 3, 2021.

- 4th HPC-TRES Workshop, December 2, 2021 (invited).

- 3rd HPC-TRES Workshop, December 10-11, 2020 (invited).

- 2nd SEG Virtual Student Conference, May 20, 2020.

- 2nd HPC-TRES Workshop, Trieste, November 18-19, 2019 (invited).

Attended seminars

- *Machine Learning and Logic for Model-Based Design and Testing*, by L. Bortolussi, Trieste, December 9, 2019.

- *Tackling Turbulence Using HPC*, by V. Armenio, Trieste, December 9, 2019.

- *Atmospheric Teleconnections*, by F. Kucharski, Trieste, December 9, 2019.

- *Earthquake Related Ground Movements Sensed by Tilt and Strainmeters and Sentinel 1 – Homage to Maria Zadro*, by C. Braitenberg, Trieste, December 10, 2019.

- *Seismic Imaging & Well logging*, by N. Bienati and D. Baldini, online event, December 18, 2020

- *Climate change: Scientific evidence, mitigation options and frontier research issues*, by F. Giorgi, online event, February 23, 2021.

- *Is the evolution of energy-based systems driven by a physical principle? Constructal Law and Thermoeconomic Optimization*, by M. Reini, online event, February 23, 2021.

- *Spontaneous clustering of convection in marginal resolution models: what is it and why do we care?*, by A. Tompkins, online event, February 24, 2021.

- *Mathematical modelling of a complex reality – An interdisciplinary journey from monotone systems to honeybee colony losses*, by D. Breda, online event, February 24, 2021.

- *Some inverse problems arising in Earth exploration*, by R. Gaburro, online event, February 25, 2021.

- *Numerical characterization of underwater noise sources*, by M. Cianferra, online event, February 22, 2022.

- *Redox processes beneath Mt. Etna recorded at the scale of mineral zoning*, by L. Ziberna, online event, February 23, 2022.

- *Numerical simulation of fluid flow in fractured rocks*, by A. Martinez, online event, February 24, 2022.

Courses

- Interactive Online Short Course, *Rock Physics and Computational Geophysics*, by J. Carcione, August 10-14, 2020.

- Theoretical Seismology by F. Romanelli (PhD course).

- Applied Seismology by S. Parolai (PhD course).

- Numerical Methods II by G. Giuliani (PhD course).

- Statistical Machine Learning by L. Bortolussi (PhD course).

Projects

- GNCS (Italian National Group of Numerical Analysis) research program *Metodi numerici e strumenti matematici innovativi per problemi differenziali non locali e frazionari* (2025).

- GNCS (Italian National Group of Numerical Analysis) research program *Risoluzione numerica di problemi differenziali non-locali e/o frazionari* (2024).

- GNCS (Italian National Group of Numerical Analysis) research program *Metodi numerici per modelli descritti mediante operatori differenzali e integrali non locali* (2023).

- GNCS (Italian National Group of Numerical Analysis) research program *Modelli di evoluzione non locali: analisi, trattamento numerico e algoritmi* (2022).

- DILEMMA project, *Imaging, modelling, monitoring and design of earthen levees*; Ministero dell'Ambiente e della Tutela del Territorio e del Mare, under the framework "Progetti di ricerca finalizzati alla previsione e alla prevenzione dei rischi geologici" (D. D. 524 del 29 novembre 2017).

Referee activity

- Review Editor for Mathematics of Computation and Data Science (special section of Frontiers in Applied Mathematics and Statistics)

- Reviewer for *BIT Numerical Mathematics, Electronic Transactions on Numerical Analysisc, Geophysical Prospecting, Geophysical Journal.*

Teaching activities

- Lecturer of the course *Numerical Methods for Geophysics* of the PhD Program in "Earth Science, Fluid-Dynamics, and Mathematics. Interactions and Methods", University of Trieste (2025).

- Tutor for the course *Analisi numerica 1* of the bachelor's in mathematics at the University of Trieste (2021, 2022, 2023, 2024, 2025). The aims of the activity is to design, programming and execute in MATLAB algorithms related to the numerical methods covered in the course.

- Tutor for the course *Analisi numerica* of the bachelor's in Artificial Intelligence and Data Analytics at the University of Trieste (2022).

- Tutor for the course *Matematica generale* of the bachelor's in Economia e Gestione aziendale and of the bachelor's in Economia internazionale e mercati finanziari (2025).

Other activities

- Member of INdAM research group GNCS (Italian National Group of Numerical Analysis) (2021, 2022, 2023, 2024, 2025).

Autorizzo il trattamento dei dati personali nelle modalità previste dal Regolamento UE 2016/679

October, 2025