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andreascaglioni

Andrea Scaglioni M.Sc.

Born 11.05.1994 in Mantova, Italy. Italian nationality

Area of specialization

Computational and applied mathematics, numerical methods for partial differential equations, finite element method, uncertainty quantification, stochastic collocation, sparse grid interpolation, (stochastic) Landau–Lifshitz–Gilbert equation, adaptive numerical methods.

Work experience

10.2024–Current	**Postdoc researcher in computational mathematics**, *University of Vienna*, Vienna (Austria) Uncertainty quantification of nonlinear stochastic PDEs with machine learning methods.
2–7.2019	**Postgraduate internship**, *EPFL*, Lausanne (Switzerland) Extension of master thesis: Further problem analysis, proved stability and convergence, Matlab code
3–8.2018	**Intern**, *Fluxim AG*, Winterthur (Switzerland) Researched (Python) and implemented (C++) global optimization algorithms in a library for applications in semiconductors engineering

Education

11.2019–10.2024	**Ph.D. in mathematics**, *TU Wien, Institute for analysis and scientific computing*, Vienna (Austria)

- 1.-4.2023 **Research stay at UNSW (Sydney, Australia)** for collaborations and conferences. Hosts: Prof. Josef Dick and Prof. Thanh Tran
- 2020–present Affiliation with *CRC Wave phenomena* (KIT Karlsruhe) and *Vienna school of mathematics* (excellence school)
- 3.2024–present **Student speaker** for *Vienna school of mathematics*
- **Teaching assistant** for several courses (see below)
- Implemented `SGMethods`, a Python library for high-dimensional sparse grid interpolation for parametric PDEs
- 18 ECTS from courses and seminars, soft skills courses (e.g. *resilience in the workplace, good scientific practice, project management, scientific writing*)

2016–2019	**Master in computational science and engineering**, *EPFL*, Lausanne (Switzerland), *GPA* 5.37/6

- Thesis: *Isogeometric discretization of the Stokes problem on trimmed domains*, with Prof. Annalisa Buffa, Dr. Rafael Vasquez, Dr. Pablo Antolin
- Project: *Haemodynamics simulations of abdominal aortic aneurysm*, with Dr. Claudia Colciago, Prof. Alfio Quarteroni
- Project: *Optimization of the rate of convergence of diffusions*, with Dr. Sebastian Krumscheid, Prof. Fabio Nobile

2013–2016	**Bachelor in mathematics**, *Universitá degli Studi di Trento*, (Italy), 110 cum Laude

Ph.D. Dissertation

title	*Sparse grid approximation of stochastic PDEs: Adaptivity and approximation of the stochastic Landau–Lifshitz-Gilbert equation*
supervisor	Prof. Michael Feischl

Abstract   We approximate random coefficient/stochastic PDEs, possibly nonlinear, time dependent, and with Gaussian noise. An example is the *stochastic Landau–Lifshitz–Gilbert* equation (SLLG) from micromagnetics. We compute a reduced-order model with *sparse grid*, a high-dimensional interpolation method. The method is non-intrusive, i.e. the random and space-time approximations are independent. We develop, implement and thoroughly analyse both a-priori and adaptive algorithms.

Skill matrix

	Level	Skill	Comment
Comp. math.	■■■■□	Uncertainty quantification	*Sparse grid, Monte Carlo methods*
	■■■■□	Finite element	*Also isogeometric analysis (IGA); proficiency with* `Fenics` *library*
	■■■□□	Numerical optimization	*Local and global optimization*
Programming	■■■■□	Python	*Written two libraries (Global optimization, sparse grid interpolation library* `SGMethods`*)*
	■■■■□	Matlab	*Extensive academic projects*
	■■■□□	C, C++	*Practice since high school; Used at Fluxim AG; Taught at TU Wien*
	■■□□□	OpenMP, MPI, Cuda	*Basic knowledge from course, final project on Cuda*
OS	■■■□□	Linux	*Good command of Bash shell*
Practices	■■■□□	Test-driven development	*Implemented in authored libraries*
	■■■□□	Git version control	*"*
	■■■□□	Code documentation	*"*

Languages

English	Professional knowledge. C1 certificate (2016)
German	Conversational. Taken courses up to C1 between 2019-2022
Italian	Mother tongue
French	Basic knowledge

Awards

- Christiana Hörbiger prize from *Christiana Hörbiger foundation*, 2021. Funding for research stay in Australia. Value 3500€
- Financial support from Zurich summer school 2021, HDA conference 2023
- Excellent graduates prize from Trento university, 2016
- Excellent high-school graduates prize from *Confindustria Lombardia*, 2013

Public events

Presentations at conferences, workshops

- *Sparse grid approximation of nonlinear SPDEs: The Landau–Lifshitz–Gilbert equation* at *High-dimensional methods in stochastic and multiscale PDEs* at *Austrian numerical analysis days*, 9.2024, Vienna (Austria)
- *Sparse grid approximation of nonlinear SPDEs: The Landau–Lifshitz–Gilbert equation* at *Sparse grid and application*, 9.2024, Bonn (Germany)

- *Sparse grid approximation of stochastic dynamic micromagnetics* at *Austrian numerical analysis days*, 5.2024, Innsbruck (Austria)
- *Sparse grid approximation of stochastic dynamic micromagnetics* at *SIAM UQ*, 2.2024, Trieste (Italy)
- *Sparse grid approximation of stochastic dynamic micromagnetics* at *Numerical analysis conference*, 7.2023, Glasgow (United Kingdon)
- *Numerical approximation of stochastic micromagnetic equations* at *High dimensional approximation*, 2.2023, Canberra (Australia)
- *Numerical approximation of stochastic micromagnetic equations* at *Computational Mathematics for High-Dimensional Data in Statistical Learning* workshop, 2.2023, MATRIX Ballarat (Australia)
- *Convergence of adaptive sparse grid finite elements* at *CMAM*, 9.2022, Vienna (Austria)
- *Numerical approximation of the stochastic Landau-Lifschitz-Gilbert equation* at *Numerical analysis of nonlinear and multiscale problems workshop*, 7.2022, Jena (Germany)
- *Convergence of adaptive sparse grid finite elements* at *MCQMC*, 7.2022, Linz (Austria)
- *Convergence of adaptive sparse grid finite elements* at *Curves and Surfaces*, 6.2022, Arcachon (France)

Summer schools, meetings
- VSM annual retreat, 2020, 2022, Yspertal (Austria), with presentations
- VSM summer school, 2020, 2021, 2022, Techendorf (Austria)
- Zurich summer school, 2021, Zurich (Switzerland)
- *Uncertainly, adaptivity and machine learning* summer school, 9.2022 Augsburg (Germany), with presentation
- *CRC wave phenomena* annual meeting, 2022, 2023, 2024, Bad Herrenalb (Germany), with presentation or poster

Other public presentations
- PDE afternoon, 2021, 2023, Vienna (Austria), with presentation
- VSM colloquium, 2022, Vienna (Austria), with presentation

Teaching

- Tutor for *Numerical optimization*, EPFL, WS2017, in English
- Tutor for *Numerik fur partielle Differentialgleichungen: Instationäre Probleme*, TU Wien, SS2020, in English
- Tutor for *Analysis 1*, TU Wien, WS2020, in German
- Written exercise sheets, administration for *Einführung in das Programmieren*, TU Wien, each semester from WS2021 to WS2023, in German

Other commitments

2018–2019	Treasurer *SIAM student chapter*, EPFL
2020–2024	Student board member of *Vienna school of mathematics* (VSM)
3.2024–ongoing	Student speaker of *Vienna school of mathematics* (VSM)

Personal interests

Photography	some of my photos can be found at `https://asphoto.netlify.app/`
Weight-lifting	since 2023
Productivity,	personal development