CURRICULUM VITAE Michael Neunteufel

Contact information

Address Fariborz Maseeh Department of Mathematics and Statistics, Portland State University
1825 SW Broadway, Portland, OR 97201, USA
Email mneunteu@pdx.edu
Web https://michaelneunteufel.github.io
ORCID 0000-0002-7039-387X

Born on March 1, 1994. Austrian citizenship

Personal profile

I published 21 peer-reviewed publications, collaborated with 25+ researchers, reviewed 20+ papers, and gave 25+ talks in wide-range applications of finite element methods including nonlinear continuum mechanics, shells, fluid-structure interaction, shape optimization, and curvature approximation. Since eight years I have been a developer of the FEM software NGSolve.

Keywords: finite element method, elasticity, shells, differential geometry, shape optimization, fluid-structure interaction, numerical relativity

Education

2017-2021 TU Wien (Austria), **Ph.D. in Technical Mathematics (with highest national distinction)**

Thesis title: "Mixed Finite Element Methods For Nonlinear Continuum Mechanics And Shells"
Thesis supervisor: Prof. Joachim Schöberl
Referees: Prof. Antonio Gil (Swansea University), Prof. Max Wardetzky (Univ-Göttingen), Prof. Astrid Pechstein (JKU Linz)

2016-2017 TU Wien (Austria), **M.Sc. in Technical Mathematics (with distinction)**

Thesis title: "Advanced Numerical Methods for Fluid Structure Interaction"
Thesis supervisor: Prof. Joachim Schöberl

2013-2016 TU Wien (Austria), **B.Sc. in Technical Mathematics (with distinction)**

Thesis title: "TRNNM - Gemischte Finite Elemente für nichtlineare Schalenmodelle"
Thesis supervisor: Prof. Joachim Schöberl

Employment

Feb 2024-present Portland State University (OR, USA)
Postdoctoral researcher in the group of Prof. Jay Gopalakrishnan

Apr 2021-Jan 2024 TU Wien (Austria)
Postdoctoral university assistant & researcher in the group of Prof. Joachim Schöberl

Nov 2017-Mar 2021 TU Wien (Austria)
Predoctoral university assistant & researcher in the group of Prof. Joachim Schöberl

Awards

2022 Promotio sub auspiciis Praesidentis rei publicae (9000€)
Awarded by the Austrian president Prof. Alexander Van der Bellen

2018 Diploma thesis award of city Vienna (750€)

Grants

2024 FWF Erwin Schrödinger Fellowship 10.55776/J4824 (150.362€)

Publications

- **Peer-reviewed**

[1] G. Fu, M. Neunteufel, J. Schöberl and A. Zdunek, *A four-field mixed formulation for incompressible finite elasticity* Comput. Methods Appl. Mech. Engrg. (accepted). arXiv:2503.00989.

[2] A. Pechstein and M. Neunteufel, *Direct coupling of continuum and shell elements in large deformation problems* Comput. Methods Appl. Mech. Engrg. (2025). 10.1016/j.cma.2025.118002.

[3] E.S. Gawlik and M. Neunteufel, *Finite element approximation of the Einstein tensor*, IMA Numer. Anal. (2025). 10.1093/imanum/draf004.

[4] A. Sky, M. Neunteufel, P. Lewintan, P. Gourgiotis, A. Zilian and P. Neff, *Novel* $H^{\mathrm{dev}}(\mathrm{Curl})$*-conforming elements on regular triangulations and Clough–Tocher splits for the planar relaxed micromorphic model*, Comput. Mech. (2025) 10.1007/s00466-025-02609-1.

[5] J. Gopalakrishnan, M. Neunteufel, J. Schöberl and M. Wardetzky, *On the improved convergence of lifted distributional Gauss curvature from Regge elements*, Results Appl. Math. 32 (2024) 100511. 10.1016/j.rinam.2024.100511.

[6] E.S. Gawlik and M. Neunteufel, *Finite element approximation of scalar curvature in arbitrary dimension*, Math. Comp. (2024) 10.1090/mcom/4038.

[7] M. Neunteufel and J. Schöberl, *The Hellan-Herrmann-Johnson and TDNNS methods for linear and nonlinear shells*, Comput. Struct. 305 (2024) 107543. 10.1016/j.compstruc.2024.107543.

[8] A. Sky, M. Neunteufel, P. Lewintan, A. Zilian, P. Neff, *Novel H(symCurl)-conforming finite elements for the relaxed micromorphic sequence* Comput. Methods Appl. Mech. Engrg. 418, Part A (2024) 116494. 10.1016/j.cma.2023.116494.

[9] J. Gopalakrishnan, M. Neunteufel, J. Schöberl and M. Wardetzky, *Analysis of curvature approximations via covariant curl and incompatibility for Regge metrics* SMAI J. Comput. Math. 9 (2023) 151–195. 10.5802/smai-jcm.98.

[10] A. Sky, M. Neunteufel, J. Hale and A. Zilian, *A Reissner-Mindlin plate formulation using symmetric Hu-Zhang elements via polytopal transformations* Comput. Methods Appl. Mech. Engrg. 416 (2023) 116291. 10.1016/j.cma.2023.116291.

[11] K. Riehl, M. Neunteufel and M. Hemberg, *Hierarchical confusion matrix for classification performance evaluation* J. R. Stat. Soc. Ser. C Appl. Stat. (2023). 10.1093/jrsssc/qlad057

[12] M. Neunteufel, K. Sturm and J. Schöberl, *Numerical shape optimization of the Canham-Helfrich-Evans bending energy.* J. Comput. Phys. 488 (2023) 112218. 10.1016/j.jcp.2023.112218.

[13] A. Zdunek, M. Neunteufel and W. Rachowicz, *On pressure robustness and independent determination of displacement and pressure in incompressible linear elasticity.* Comput. Methods Appl. Mech. Engrg. 409 (2023) 115714. 10.1016/j.cma.2022.115714.

[14] A. Sky, M. Neunteufel, I. Münch, J. Schöberl and P. Neff, *Primal and mixed finite element formulations for the relaxed micromorphic model*, Comput. Methods Appl. Mech. Engrg. 399 (2022) 115298. 10.1016/j.cma.2022.115298.

[15] M. Neunteufel, A. Pechstein and J. Schöberl, *Three-field mixed finite element methods for nonlinear elasticity*, Comput. Methods Appl. Mech. Engrg. 382 (2021) 113857. 10.1016/j.cma.2021.113857.

[16] A. Sky, M. Neunteufel, I. Münch, J. Schöberl and P. Neff, *A hybrid* $H^1 \times H(\mathrm{curl})$ *finite element formulation for a relaxed micromorphic continuum model of antiplane shear*, Comput. Mech. 68 (1) (2021) 1–24. 10.1007/s00466-021-02002-8.

[17] P. Gangl, K. Sturm, M. Neunteufel and J. Schöberl, *Fully and semi-automated shape differentiation in NGSolve*, Struct. Multidiscip. Optim. 63 (3) (2021) 1579–1607. 10.1007/s00158-020-02742-w.

[18] D. Melching, M. Neunteufel, J. Schöberl and U. Stefanelli, *A finite-strain model for incomplete damage in elastoplastic materials*, Comput. Methods Appl. Mech. Engrg. 374 (2021) 113571. 10.1016/j.cma.2020.113571.

[19] M. Neunteufel and J. Schöberl, *Avoiding membrane locking with Regge interpolation*, Comput. Methods Appl. Mech. Engrg. 373 (2021) 113524. 10.1016/j.cma.2020.113524.

[20] M. Neunteufel and J. Schöberl, *Fluid-structure interaction with H(div)-conforming finite elements*, Comput. Struct. 243 (2021) 106402. 10.1016/j.compstruc.2020.106402.

[21] M. Neunteufel and J. Schöberl, *The Hellan–Herrmann–Johnson method for nonlinear shells*, Comput. Struct. 225 (2019) 106109. 10.1016/j.compstruc.2019.106109.

- **Preprints**

[1] S. Bartels, A. Bonito, P. Hornung and M. Neunteufel, *Babŭska's paradox in a nonlinear bending model* (2025). arXiv:2503.17190.

[2] J. Li, M. Neunteufel, L. Zhu, *A novel finite element method for simulating surface plasmon polaritons on complex graphene sheets*, submitted (2024).

[3] A. Dziubek, K. Hu, M. Karow and M. Neunteufel, *Intrinsic mixed finite element methods for linear Cosserat elasticity and couple stress problem* (2024). arXiv:2410.14176.

[4] A. Sky, M. Neunteufel, J.S. Hale and A. Zilian, *Formulae and transformations for simplicial tensorial finite elements via polytopal templates* (2024). arXiv:2405.10402.

[5] J. Gopalakrishnan, M. Neunteufel, J. Schöberl and M. Wardetzky, *Generalizing Riemann curvature to Regge metrics* (2023). arxiv:2311.01603.

- **Proceedings**

[1] A. Sky, M. Neunteufel, Jack S. Hale and A. Zilian, *Eine schubversteifungsfreie Reissner-Mindlin-Plattenformulierung mittels Hu-Zhang-Element* 15. Fachtagung Baustatik-Baupraxis (2024). https://hdl.handle.net/10993/60522.

[2] T. Danczul, W. Hetebrij, F. Khalighi, L. Kogler, D. Lahaye, E. Luckins, W. Munters, M. Neunteufel and C. Vuik, *Modeling airflow-driven water droplet removal from a flat surface*, SWI 2020: 157th European Study Group with Industry (2020) 177–214. http://ta.twi.tudelft.nl/users/vuik/papers/SWI22.pdf.

- **Other**

[1] J. Gopalakrishnan, M. Neunteufel, J. Schöberl and M. Wardetzky, *Analysis of curvature approximations via covariant curl and incompatibility for Regge metrics* Oberwolfach report www.mfo.de/occasion/2225/www_view (2022).

[2] M. Neunteufel, A. Pechstein and J. Schöberl, *Mixed Finite Element Methods for Nonlinear Elasticity and Shells* Oberwolfach report www.mfo.de/occasion/2102/www_view (2021).

Teaching experience

Spring 2025	RTG Seminar *Continuum mechanics*, Portland State University
SS 2023	Seminar *An introduction to the finite element software NGSolve*, University Luxembourg
SS 2023	Exercise class *Mathematics 2 for Electrical Engineering*, TU Wien
WS 2022/23	Lecture with exercise class *Finite Elements for Differential Geometry*, TU Wien
SS 2022	Exercise class *Numerics of partial differential equations: instationary problems*, TU Wien
WS 2021/22	Exercise class *Numerics of partial differential equations: stationary problems*, TU Wien
SS 2021	Exercise class *Numerics of partial differential equations: instationary problems*, TU Wien
WS 2020/21	Exercise class *Numerics of partial differential equations: stationary problems*, TU Wien
SS 2020	Exercise class *Calculus 2*, TU Wien
WS 2019/20	Exercise class *Calculus 1*, TU Wien
SS 2019	Exercise class *Numerics of partial differential equations: instationary problems*, TU Wien

Mentoring

- **Diploma**

2022	Co-advisor: Edoardo Bonetti *Numerical method for weak gravitational formulation* 10.34726/hss.2022.106702

Research visits

Nov 2024 Santa Clara University, US, at Prof. Evan Gawlik (with invited talk)
Jul 2023 Suny Polytechnic Institute, US, at Prof. Andrea Dziubek (with seminar course)
Jul 2023 Portland State University, US, at Prof. Jay Gopalakrishnan
Mai 2023 University Luxembourg, Luxembourg, at Prof. Andreas Zilian (with invited talk)
Feb 2023 University of Hawai'i at Manoa, US, at Prof. Evan Gawlik (with invited talk and seminar)
Jan 2020 University of Stuttgart, Germany, at Prof. Manfred Bischoff (with invited talk)
Oct 2019 Johannes Kepler University Linz, Austria, at Prof. Astrid Pechstein (with invited talk)
Jan 2018 University of Göttingen, Germany, at Prof. Christoph Lehrenfeld (with invited talk)

Conferences & Workshops

- **Invited & contributed talks**

Jul 2024 SIAM Annual Meeting (AN24), Spokane (WA), US
Jun 2024 5th NGSolve User Meeting, Vienna, Austria
Apr 2024 8th Cascade RAIN Mathematics Meeting, Portland (OR), US
Nov 2023 Workshop "Vector- and Tensor-Valued Surface PDEs", Dresden, Germany
Sep 2023 10th GACM Colloquium on Computational Mechanics, Vienna, Austria
Sep 2023 ENUMATH 2023, Lisbon, Portugal
Jul 2023 Workshop: Geometric Mechanics and Structure Preserving Discretizations of Shell Elasticity, Utica, US
Jul 2023 4th NGSolve User Meeting, Portland (OR), US
Jun 2023 1st Jena-Augsburg Meeting on Numerical Analysis, Augsburg, Germany
Apr 2023 17th Austrian Numerical Analysis Day, Vienna, Austria
Mar 2023 PDE Afternoon, TU Wien/University of Vienna/IST Austria, Vienna, Austria
Jul 2022 WAND2022, Salzburg, Austria
Jun 2022 Hilbert Complexis: Analysis, Applications, and Discretizations, Oberwolfach, Germany
May 2022 16th Austrian Numerical Analysis Day, Linz, Austria
Sep 2021 DMV-ÖMG Jahrestagung 2021, Passau, Germany (online)
Jul 2021 ICOSAHOM 2020, Vienna, Austria (online)
Jan 2021 Nonstandard Finite Element Methods, Oberwolfach, Germany (online)
Jul 2019 International Congress on Industrial and Applied Mathematics, Valencia, Spain
Jul 2019 3rd NGSolve User Meeting, Vienna, Austria
Jan 2019 90st GAMM Annual Meeting, Vienna, Austria
Jul 2018 2nd NGSolve User Meeting, Göttingen, Germany
Jun 2018 FEEC and High Order Methods, Oslo, Norway
May 2018 14th Austrian Numerical Analysis Day, Klagenfurt, Austria
Sep 2017 30th Chemnitz FEM Symposium, Strobl, Austria
Jun 2017 1st NGSolve User Meeting, Vienna, Austria
May 2016 12th Austrian Numerical Analysis Day, Innsbruck, Austria

- **Participated**

Apr 2023 2nd SFB International Workshop, Vienna, Austria (with poster)
Jan 2020 SWI 2020 Study Group Mathematics with Industry, Fontys Tilburg, Netherlands
Sep 2019 VSM Summer School, Weissensee, Austria
Aug 2019 DK Summer School, Weissensee, Austria
Jan 2019 DK Winter School, Reichenau, Austria
Jan 2018 DK Winter School, Reichenau, Austria
May 2017 13th Austrian Numerical Analysis Day, Salzburg, Austria
Oct 2016 Special Semester on Computational Methods in Science and Engineering, Linz, Austria

Scientific training

Oct 2023 Course *FWF ESPRIT & Schrödinger - The missing manual* (Austria)
Apr 2022 Seminar *Essentials in National Research Funding* (Austria)
Jun 2020 Course in proposal writing
Jan 2019 Course in scientific writing
Jan 2018 Course in presentation techniques

Research experience

2021-2023 SFB Taming Complexity in Partial Differential Systems, Automated Discretization in Multiphysics, Austrian Science Fund (FWF) 1429331/F 6511-N36 (member)
Feb-Oct 2021 Multiface Observation of Interface Evolution, AC2T research GmbH 1931712 (member)
2017-2021 Completed "Dissipation and Dispersion in Nonlinear PDEs" (nPDE) DK program (member)
2019-2021 Completed "Vienna School of Mathematics" (member)
2017-2019 Numerics of Dissipation, Austrian Science Fund (FWF) W 1245 (member)

Organization of scientific events

Jul 2025 Co-organizer of workshop *Geometric Mechanics, Structure Preserving Discretization, and Discrete Differential Geometry*, Utica NY, US
Sep 2023 Member organizing committee of *10th GACM Colloquium on Computational Mechanics*, Vienna

- **Technical assistant**

Jul 2021 ICOSAHOM 2020, Vienna
Jul 2019 3rd NGSolve User-Meeting, Vienna
Feb 2019 90st GAMM Annual Meeting, Vienna

Journal referee

- **Member**

Sep 2024-present Editorial board Computers and Mathematics with Applications (CAMWA)

- **Journals (alphabetic order)**
  Advances in Computational Mathematics; Computational Mechanice; Computers and Mathematics with Applications; Engineering Analysis with Boundary Elements; Foundations of Computational Mathematics; IMA Journal of Numerical Analysis, Journal of Computational and Applied Mathematics; Journal of Intelligent Material Systems and Structures; Journal of Numerical Mathematics; Journal of Scientific Computing; SIAM Journal of Numerical Analysis; SIAM Journal on Scientific Computing

Co-authors (alphabetic order)

Sören Bartels (University of Freiburg)
Andrea Dziubek (SUNY Polytechnic Institute)
Guosheng Fu (University of Notre Dame)
Peter Gangl (JKU Linz)
Evan Gawlik (Santa Clara University)
Jay Gopalakrishnan (Portland State University)
Panos Gourgiotis (National Technical University of Athens)
Jack Hale (University Luxembourg)
Martin Hemberg (Harvard University)
Peter Hornung (TU Dresden)
Kaibo Hu (University of Edinburgh)
Michael Karow (TU Berlin)
Peter Lewintan (University Duisburg-Essen)
Jichun Li (University of Nevada Las Vegas)
David Melching (German Aerospace Center)
Ingo Münch (Technical University Dortmund)
Patrizio Neff (University Duisburg-Essen)
Astrid Pechstein (JKU Linz)
Waldemar Rachowicz (Cracow University of Technology)
Kevin Riehl (ETH Zurich)
Joachim Schöberl (TU Wien)
Adam Sky (University Luxembourg)
Ulisse Stefanelli (University of Vienna)
Kevin Sturm (TU Wien)
Max Wardetzky (University of Göttingen)
Adam Zdunek (HB BerRit)
Andreas Zilian (University Luxembourg)
Li Zhu (Portland State University)

Programming & Software skills

Languages	C, C++, Java, Python
Software	Matlab, Maple, NGSolve

Languages

German (mother tongue)
English (fluent)
Italian (basic)