NICOLAS VENKOVIC

[**venkovic.github.io**]

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Updated in 11/2026.

SKILLS AND INTERESTS

In alphabetical order:

Algorithms	Iterative Methods	Numerical Analysis
Approximation Theory	Linear Algebra	Scientific Computing
Data Science	Machine Learning	Systems Performance

EXPERIENCE

Postdoctoral Researcher @ Chair of Computational Mathematics, TU Munich 07/2024 – now

- Conducting research on *Petrov-Galerkin Methods for Structured Approximation in Hilbert Spaces*
- Evaluating performance of *Permutation-Avoiding Kernels for Fast Discrete Convolution Algorithms*

Lecturer @ Chair of Computational Mathematics, TU Munich 10/2024 – now

- *Numerical Linear Algebra for Computational Science and Information Engineering (CITHN2006)*
  Teaching (3×42 hrs) + material development (**course website**)
- *Numerical Programming (CITHN1008)*
  Teaching (1×42 hrs) + material development (**course website**)

Software Systems Developer @ Mica Team, NXP Semiconductors 09/2022 – 04/2024

- Improved performance of in-house circuit simulator through *Randomized Iterative Methods, Harmonic Restarted Arnoldi Methods and Sparse BLAS*

Doctoral Researcher @ Parallel Algorithms (Algo) Team, Cerfacs 10/2018 – 10/2021

- Developed *Preconditioning Strategies for Iterative Solves of Stochastic Elliptic PDEs*

Research Assistant @ Johns Hopkins University 09/2013 – 09/2018

- Meyerhoff Fellow of *Numerical Algorithms for Classical Physics and Computational Geometry*

Visiting Graduate Student @ Massachusetts Institute of Technology (MIT) 09/2011 – 02/2012

- 2nd-best FQRNT Master Scholar of *Materials Science* in Province of Quebec

Research Intern @ Phimeca 05/2011 – 08/2011

- Alexander Graham Bell and Michael Smith Scholar of *Statistical Micromechanics*

Research Assistant @ Université Laval 05/2008 – 12/2010

- Undergraduate NSERC Awardee of *Geostatistics and Iterative Metaheuristics for Global Optimization*

EDUCATION

PhD Applied Mathematics & Scientific Computing @ University of Bordeaux 09/2023
Thesis on Iterative Methods for Stochastic PDEs

MSE Applied Mathematics & Statistics @ Johns Hopkins University 05/2018
Specialization in Computational Mathematics

AWARDS AND DISTINCTIONS

Bravo Award, NXP Semiconductors 2023
USNCCM14 Travel Award, US Association of Computational Mechanics 2017
HEMI Travel Grant, Hopkins Extreme Materials Institute 2016
Meyerhoff Fellowship, Johns Hopkins University 2013

CEE Department Fellowship (Unclaimed), Massachusetts Institute of Technology (MIT)	2013
Canadian National Scholarship, Canadian National Railway Company	2013
Excellence Award, Université Laval	2013
Michael Smith Foreign Study Supplement, NSERC	2011
Alexander Graham Bell Scholarship, NSERC	2011
Master's Scholarship, 2nd-best candidature in Province of Quebec, FQRNT	2011
Undergraduate Student Research Award, NSERC	2010

TEACHING AND TEACHING ASSISTANCE

Numerical Programming - Bachelor-level Lecturer (**1×42 hrs**, **course website**) @ TU Munich	2026 – now
Numerical Linear Algebra for Computational Science and Information Engineering - Master-level Lecturer (**3×42 hrs**, **course website**) @ TU Munich	2024 – now
Applied Mathematics for Engineers - Master-level Teaching Assistant @ Johns Hopkins University	2018
Dynamics - Master-level Teaching Assistant @ Johns Hopkins University	2016 – 2017
Probability & Statistics - Bachelor-level Teaching Assistant @ Johns Hopkins University	2016
Solid Mechanics - Master-level Teaching Assistant @ Johns Hopkins University	2015
Computer Science for Engineers - Bachelor-level Teaching Assistant @ Université Laval	2013

PUBLICATIONS

Journal Papers (J): 2 Preprints (P): 3 Conference Paper (CP): 1 Technical Reports (TR): 2
Citations: 97 h-index: 4 i10-index: 3

[P03] N. Venkovic and H. Anzt (2026) *Minkowski tensors of anisotropic Voronoi diagrams. arXiv preprint, arXiv:2610.08656.* [**pdf**].

[P02] N. Venkovic and H. Anzt (2025) *Global iterative methods for sparse approximate inverses of symmetric positive-definite matrices. arXiv preprint, arXiv:2511.09753.* [**pdf**].

[P01] N. Venkovic and H. Anzt (2025) *Permutation-avoiding FFT-based convolution. arXiv preprint, arXiv:2506.12718.* [**pdf**].

[PhD] N. Venkovic (2023) *Preconditioning strategies for stochastic elliptic partial differential equations.* PhD thesis, Université de Bordeaux. [**pdf**]

[TR2] N. Venkovic, P. Mycek, L. Giraud and O. P. Le Maître (2021) *Recycling Krylov subspace strategies for sequences of sampled stochastic elliptic equations.* RR-9425, Inria Bordeaux-Sud Ouest. hal-03366966. [**pdf**]

[TR1] N. Venkovic, P. Mycek, L. Giraud and O. P. Le Maître (2020) *Comparative study of harmonic and Rayleigh-Ritz procedures with application to deflated conjugate gradients.* Cerfacs technical report TR-PA-20-3. [**pdf**]

[MSc] N. Venkovic (2016) *Nanoindentation relaxation study and micromechanics of cement-based materials.* MSc thesis, Université Laval.

[J2] N. Venkovic, L. Sorelli and F. J. Martirena (2014) *Nanoindentation study of calcium silicate hydrates in concrete produced with effective microorganisms-based bioplasticizer.* Cement and Concrete Composites, 47, 127-139.

[CP1] N. Venkovic, M. Lebeau and J.-M. Konrad (2013) *Geostatistical assessment of the hydraulic conductivity of an embankment dam.* Proceedings of the 66th Canadian Geotechnical Conference, Montreal, Canada.

[J1] N. Venkovic, L. Sorelli, B. Sudret, T. Yalamas and R. Gagné (2013) *Uncertainty propagation of a multiscale poromechanics-hydration model for poroelastic properties of cement paste at early-age.* Probabilistic Engineering Mechanics, 32, 5-20

PRESENTATIONS

[10] N. Venkovic and H. Anzt (August 13, 2026) *Structured iterative approximations in numerical (multi-)linear algebra.* JuliaCon 2026, Johannes Gutenberg University, Mainz, Germany. [**pdf**]

[09] N. Venkovic, A. Bouslama, A. Jeendgar and H. Anzt (June 2-5, 2026) *Petrov-Galerkin approximations in (multi)-linear algebra from the lens of optimization.* aiming for SIAM Conference on Optimization (SIAM OP26), University of Edinburgh, Edinburgh, United Kingdom. [**pdf**]

[08] N. Venkovic, A. Bouslama, A. Jeendgar and H. Anzt (March 3-6, 2026) *Parallel locally optimal iterative methods.* aiming for SIAM Conference on Parallel Processing (SIAM PP26), Zuse Institute, Berlin, Germany. [**pdf**]

[07] N. Venkovic and H. Anzt (October 23, 2025) *Iterative methods for sparse approximate inverses of symmetric positive-definite matrices.* GAMM Workshop on Applied and Numerical Linear Algebra (ANLA 2025), University of Bologna, Bologna, Italy. [**pdf**]

[06] N. Venkovic and H. Anzt (October 17, 2025) *Randomized short-recurrence iterative methods for approximate low-rank factorizations.* GAMM Workshop on Computational and Mathematical Methods in Data Sciences (COMinDS 2025), Technical University of Chemnitz, Chemnitz, Germany. [**pdf**]

[05] N. Venkovic, P. Mycek, L. Giraud and O. P. Le Maître (June 20, 2023) *Preconditioners based on Voronoi quantizers of random coefficient fields for the iterative solves of stochastic elliptic partial differential equations.* Sparse Days 2023, Cerfacs, Toulouse, France. [**pdf**]

[04] N. Venkovic, P. Mycek, L. Giraud and O. P. Le Maître (March 18, 2019) *Recycling Krylov subspace strategies to solve stochastic elliptic equations*, Uncertainty Quantification and OPtimization (UQOP2019). Sorbonne University, Paris, France. [**pdf**]

[03] N. Venkovic and L. Graham-Brady (July 17, 2017) *Homogenization based on realization-dependent Hashin-Shtrikman functionals of piecewise polynomial trial polarization fields*, 14th US National Congress on Computational Mechanics (USNCCM14). Montreal, QC, Canada. [**pdf**]

[02] N. Venkovic and L. Graham-Brady (May 25, 2016) *Stochastic simulation of random material microstructures using ellipsoidal growth structures.* PMC 2016, ASCE Probabilistic Mechanics & Reliability Conference, Vanderbilt University, Nashville, TN, USA. [**pdf**]

[01] N. Venkovic, L. Graham-Brady and K. Teferra (June 18, 2015) *Stochastic morphological simulation based on partial statistical description of polycrystals.* EMI 2015, ASCE Engineering Mechanics Institute Conference, Stanford University, Palo Alto, CA, USA. [**pdf**]

Speaker

POSTERS

[5] K. Tuteja, G. Olenik, R. Mishchuk, N. Venkovic, M. Götz, A. Streit, H. Anzt and C. Debus (June 10, 2025) *pyGinkgo: Python bindings for Ginkgo.* PASC25 conference, Brugg, Switzerland.

[4] K. Tuteja, G. Olenik, R. Mishchuk, N. Venkovic, M. Götz, A. Streit, H. Anzt and C. Debus (June 10, 2025) *pyGinkgo: A sparse linear algebra operator framework for Python.* ISC High Performance 2025, Hamburg, Germany.

[3] N. Venkovic, P. Mycek, L. Giraud and O. P. Le Maître (October 8, 2020) *Deflated iterative solver for stochastic elliptic PDEs.* JDD 2020, Cerfacs, Toulouse, France.

[2] N. Venkovic and L. Graham-Brady (April 4, 2018) *A piecewise polynomial approximation scheme based on the Hashin-Shtrikman variational principle of polycrystals.* MACH 2018, Annapolis, MD, USA.

[1] N. Venkovic and L. Graham-Brady (July 18, 2017) *Homogenization based on realization-dependent Hashin-Shtrikman functionals of piecewise polynomial trial polarization fields.* 14th US National Congress on Computational Mechanics (USNCCM14), Montreal, QC, Canada.

Presenter

SUPERVISED RESEARCH

K.-H. You (in preparation). *LOBPCG in pyGinkgo: Software Design and CPU/GPU Performance*, Master thesis, TU Munich

H. Langar (2026). *Hybrid wavelet learning for gunshot detection: complementarity, fusion and its limits.* Bachelor thesis, TU Munich.

I. Vasenkov (2026) *Parallel locally optimal approximate sparse matrix inverses.* Master thesis, TU Munich.

H. Dausy (2026) *Comparative testing of Newton and Chebyshev-type iterative methods on sparse approximate inverse problems.* Bachelor colloquium, TU Munich.

L. Chowdhury (2026) *Computing approximate matrix inverses with low and mixed precision.* Bachelor thesis, TU Munich.

A. Fung (2026) *Iterative methods for low-rank canonical polyadic tensor approximation.* Bachelor thesis, TU Munich.

OPEN SOURCE SOFTWARE CONTRIBUTIONS

[16] `c-permutation-avoiding-convolution`† (C) [**GitHub repo**]
Permutation-avoiding convolution kernels

[15] `cpp-green`† (C++) [**GitHub repo**]
Dynamic programming algorithms for high-order derivatives of anisotropic Green's functions

[14] `cpp-hashin-shtrikman`† (C++) [**GitHub repo**]
Piecewise polynomial approximation scheme based on the Hashin-Shtrikman variational principle of polycrystals

[13] `cpp-minkowski`† (C++) [**GitHub repo**]
Semi-analytical boundary solve of non-convex tessellation and computation of high-order Minkowski tensors

[12] `cpp-n-pcf`† (C++) [**GitHub repo**]
Algorithms for the computation of n-points correlation functions

[11] `fortran-get-vol-omp`† (Fortran) [**GitHub repo**]
Multithreaded subroutines to solve non-convex tessellations and associated statistics

[10] `julia-global-spd-spai`† (Julia) [**GitHub repo**]
Global iterative methods for the computation of sparse approximate inverses of symmetric positive-definite matrices

[09] `julia-gp-circulant-embedding`† (Julia) [**GitHub repo**]
Circulant embedding method to simulate Gaussian processes

[08] `julia-jacobi-davidson`† (Julia) [**private GitHub repo** available on request]
(Jacobi-)Davidson methods with different orthogonalization procedures and their randomized variants

[07] `julia-lobpcg`† (Julia) [**GitHub repo**]
Stable implementations of LOBPCG

[06] `julia-phd-krylov-spdes`† (Julia) [**GitHub repo**]

Preconditioning strategies for stochastic elliptic PDEs

[05] `matrix-market`† (.mtx) [**GitHub repo**]
Sparse matrices made available in Matrix Market format

[04] `py-deflation`† (Python) [**GitHub repo**]
Deflation strategies of conjugate gradient algorithms

[03] `py-lobpcg`† (Python) [**GitHub repo**]
Stable implementations of LOBPCG

[02] `SparseApproximateInverses.jl`† (Julia) [**GitHub repo**]
Global iterative methods for the computation of sparse approximate inverses of symmetric positive-definite matrices

[01] `julia-iterative-low-rank`† (Julia) [**private GitHub repo** available on request]
Randomized short-recurrence iterative methods for approximate low-rank matrix factorizations

†: Main Contributor

PARTICIPATION TO ADMISSION COMMITTEE

BSc in Information Engineering — TU Munich, Germany
Aptitude Assessment of Admission Candidates (2024, 2025, 2026)

PEER REVIEWING

SIAM Journal of Scientific Computing (since 2024) [**ORCID entries**]
IEEE International Parallel & Distributed Processing Symposium (IPDPS25)

PAST COLLABORATORS

In alphabetical order:

H. Anzt | Professor | `hartwig[dot]anzt[at]tum[dot]de`
Chair of Computational Mathematics, TU Munich, Germany

L. Giraud | Research Director | `luc[dot]giraud[at]inria[dot]fr`
Concace Team, Inria, France

L. Graham-Brady | Professor | `lori[at]jhu[dot]edu`
Center on AI for Materials in Extreme Environments, Johns Hopkins University, USA

K. Gullapalli | Fellow | `kiran[dot]gullapalli[at]nxp[dot]com`
Mica Team, NXP Semiconductors, USA

O. Le Maître | Research Director | `olivier.le-maitre[at]polytechnique[dot]edu`
Platon Team, Center for Applied Mathematics, CNRS, École Polytechnique, France

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L. Sorelli | Professor | `luca[dot]sorelli[at]gci[dot]ulaval[dot]ca`
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B. Sudret | Professor | `sudret[at]ethz[dot]ch`
Chair of Uncertainty Quantification, ETH Zurich, Switzerland