# Thomas Mejstrik

*MMag. Dr. Thomas Mejstrik BA*
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I am a mathematician and software engineer working on highly performant, efficient, parallel, numerical algorithms. My core expertise lies in linear algebra and linear iterated interpolation schemes (on the math side) and in Software Design, Cuda, C++, Matlab and unit testing (on the software side). I love to, and try to, learn new stuff every day, apply my knowledge to unsolved problems, improve existing solutions, and share ideas with others.

I am a senior postdoc and project leader at the Math Faculty of the *University of Vienna*, worked as a senior software developer at *Dimetor, Vienna*, obtained a Master in Piano Education from the *Music University of Vienna*, lived two years in China, and am father of three daughters.

## Education

March 2016 – April 2019 **PhD in Mathematics**, *with Maria Charina, University of Vienna*, Austria, Graduated with distinction
Thesis: Joint spectral radius and subdivision schemes

October 2008 – June 2016 **Bachelor/Master in Music education – Piano**, *University of Music and performing arts Vienna/Central Conservatory of Music Beijing*, Graduated with distinction
Thesis: Real Time Computation of Redressed Frequency Warped Gabor Expansion

March 2013 – June 2016 **Master in Music education – Voice and Instruments – Piano**, *with Manon Liu Winter, University of Music and performing arts Vienna*, Austria, Graduated with distinction
Thesis: Real Time Computation of Redressed Frequency Warped Gabor Expansion

October 2013 – June 2014 **Piano Concert Studies**, *with You Xi*（由熹）, *Central Conservatory of Music*（中央音乐学院）, *Beijing*, China, Fellow of the Chinese embassy in Austria

October 2008 – March 2013 **Bachelor in Music education – Voice and Instruments – Piano**, *with Johannes Marian, University of Music and performing arts Vienna*, Austria, Graduated with distinction
Thesis: About contemporary sources of Viennese music

October 2007 – June 2014 **Chinese studies**, *Central China Normal University/University of Vienna*, China/Austria, not finished

2008 – 2014 **Chinese studies**, *University of Vienna*, Austria, Not finished

October 2007 – June 2008 **Chinese studies**, *Central China Normal University*（华中师范大学）, *Wuhan*, China, Fellow of the Chinese embassy in Austria

October 2004 – Dec. 2010 **Diploma in Mathematics**, *with Adrian Constantin, University of Vienna*, Austria, graduated with distinction

June 2004 **School leaving exam**, *HTBLuVA Mödling, Department for precision mechanics*, Austria, Graduated with distinction

Thesis: Testing and measuring device for a transpalatal arch in connection with a palate implant

## Positions

since June 2024 **C++ Committee member**, *Member of Austrian Body of ISO/IEC JTC1/SC22/WG21*, Austria, Submitted papers: P3546

June 2020 - May 2025 **Post Doc**, *Faculty of Mathematics, University of Vienna*, Austria, Project leader: Analysis of non-uniform subdivision schemes

Nov. 2019 – Feb. 2024 **Senior Software Developer**, *dimetor* , Vienna, *airbornerf.com*[↑]

Developing radio propagation models in Cuda/C++

October 2017 – June 2018 **Teaching Assistant**, *University of Vienna*, Austria

Lecturer for exercise classes in Linear Algebra and Analysis

October 2012 – March 2017 **Head of Office**, *Bureau of women affairs of the Austrian National Student Union at the University of Music Vienna*, Austria

## Career breaks

Sept. 2022 – March 2023 **Parental leave**, *Father of twins*

April 2019 – October 2019 **Parental leave**, *Father of one daughter*

## Certificates

April 24 – 28, 2023 **Parallelization course**, *Parallelization with MPI and OpenMP*, VSC Vienna Scientific Cluster

May 16 – 19, 2022 **Deep learning course**, *Deep Learning and GPU Programming Workshop*, Online/LRZ Leibniz-Rechenzentrum der Bayerischen Akademie der Wissenschaften

March 21 – 24, 2022 **C++ course**, *with Klaus Iglberger, Advanced modern C++ Software Design*, Online/VSC Vienna Scientific Cluster

March 10 – 12, 2021 **HPC course**, *with Georg Hager and Gerhard Wellein, Node-Level Performance Engineering*, Online/VSC Vienna Scientific Cluster

## Concerts and Masterclasses

3. – 12. Nov. 2016 **Participation in the Klavierinstallation: Georg Nussbaumer: Eine Winterreise**, *Konzerthaus Wien*, Austria

2009, 2010, 2012, 2013, 2015 **Master classes**, *with Stephen Montague, Andrea Vigani, Tim Ovens, Victor Ibarra and Frederic Rzewski, Vienna Days for contemporary piano-music*, University of Music and performing arts Vienna, Austria

25. Nov. 2012 **Participation in the concert Symphony for 100 Pianists**, *with Hermann Nietsch and Peter Jan Marthé, Vienna Days for contemporary piano-music*, Linz, Österreich

26. Apr. 2013 **Concert with Platypus – Verein und Ensemble für neue Musik**, *Wien*, Austria

2008 **Pianist**, *Grammy Bar*, Wuhan, China

2004, 2005, 2007, 2009 **Master classes**, *with Erwin Schmidt, Christoph Czech and Peter Herbert*, Jazzakademie Zeillern, Austria

2006 **Master class**, *with Barbara Moser*, Austrian Master Classes, Zell an der Pram Austria

## Languages

German Mother tongue

English Fluent

Chinese Moderate

## Software Skills

C++

STL

TDD

C

Python

Cuda

Matlab

git

HTML

Sibelius

Excel

Latex

Photoshop

QBasic

## Notable Software written (excluding closed source Software)

TTEST Unit test framework for Matlab/Octave for scientific software. gitlab: *tommsch/ttest*[↑], Features: Property based tests, Performance tests, Death tests, Goldstandard tests, Inection testing, Logging, 100x faster than Matlab's...

t-toolboxes Methods for computation of the joint spectral radius and regularity analysis of multiple subdivision schemes, gitlab: *tommsch/ttoolboxes*[↑], Features: Fastest Invariant polytope algorithm in the west, ...,written in Matlab

wabor Plug-in for *PureData*↑ for realtime analysis and synthesis of audio signals with frequency warped frames, Link: *tommsch.com/science.php*↑, written in C

## Publications

Link to all publications: tommsch.com/science.php

### White Papers

- Thomas Mejstrik, *P3546, Explicit return type deduction for `std::numeric_limits` and numbers*, C++ standardization committee SG18, ↑wg21.link/P3546R0.
- Thomas Mejstrik, *P3689, Convenience functions for Random number generation*, C++ standardization committee SG18, ↑wg21.link/P3546R0.
- Thomas Mejstrik, *`__host__ __device__` - Generic programming for Cuda, proposal for language changes, submitted to Nvidia, ↑Link .*

### Not peer reviewed

- Thomas Mejstrik, Clara Hollomey, *TTEST for Matlab and Octave: Unit testing scientific code*, Fortschritte der Akustik - DAGA 2022, 48. Jahrestagung für Akustik, Stuttgart, Germany, 2022, gitlab.com/-tommsch/ttest/.
- Thomas Mejstrik, *Virtuosinnen / Woman Virtuosi*, Spielräume Magazin, University of Music and Performing Arts Vienna, Austria, 1 (2016).

### Preprints

1. Thomas Mejstrik, Vladimir Yu. Protasov, *Stability under dwell time constraints: Discretization revisited*, Nonlinear Analysis: Hybrid Systems, 57 (2025) 101608, 1–12, arXiv: 2402.04795, doi: 10.1016/j.nahs.-2025.101608.
2. Thomas Mejstrik, Ulrich Reif, *Hybrid approach to the joint spectral radius computation*, submitted to Lin. Alg. Appl., arXiv: 2308.05244.

### Peer reviewed

1. Thomas Mejstrik, Vladimir Yu. Protasov, *Stability under dwell time constraints: Discretization revisited*, accepted, Nonlinear Analysis: Hybrid Systems, arXiv: 2402.04795.
2. Thomas Mejstrik, Sebastian Woblistin, *Patterns for `__host__ __device__` programming in Cuda*, EuroPLoP 24, doi: 10.1145/3698322.3698329.
3. Thomas Mejstrik, Taulant Berisha, Sebastian Woblistin, *Fast computation of radio wave propagation effects*, Int. J. Commun. Syst., (2024) e5930. doi: 10.1002/dac.5930.

4. Thomas Mejstrik, Vladimir Yu. Protasov, *Elliptic polytopes and invariant norms of linear operators*, Calcolo 60 (2023) 56, arXiv: 2107.02610, doi: 10.1007/s10092-023-00547-z.

5. Thomas Mejstrik, *The finiteness conjecture for 3x3 binary matrices*, Dolomites Research Notes On Approximation, 15 (2022) 5, arXiv: 2505.10178, doi: 10.14658/pupj-drna-2022-5-3.

6. Thomas Mejstrik, Clara Hollomey, *Injection testing backed refactoring*, EuroPLoP 2022, Proceedings of the European Conference on Pattern Languages of Programs, doi: 10.1145/3551902.3551966.

7. Maria Charina, Costanza Conti, Thomas Mejstrik, Jean-Louis Merrien, *Joint Spectral Radius and Ternary Hermite Subdivision*, Adv. Comput. Math., 47 (2021) 25, hal: 02615136, doi: 10.1007/s10444-021-09854-x.

8. Thomas Mejstrik, *Improved invariant polytope algorithm and applications*, ACM Trans. Math. Softw., 46, 3 ( 2020 ) 29, arXiv: 1812.03080, doi: 10.1145/3408891.

9. Maria Charina, Thomas Mejstrik, *Multiple multivariate subdivision schemes: Matrix and operator approaches*, Comp. Appl. Math., 349 (2018), 279–291, arXiv: 1808.08050, doi: 10.1016/j.cam.2018.08.013.

10. Thomas Mejstrik, Gianpaolo Evangelista, *Estimates of the Reconstruction Error in Partially Redressed Warped Frames Expansions*, Proc. of Digital Audio Effect Conf. (DAFx16), (2016), arXiv: 1812.03279 .

11. Thomas Mejstrik, *Some Remarks on Nagumo's Theorem*, Czechoslovak Mathematical Journal, 62 (2012) 1, 235–242, tommsch.com/misc/remarks_nagumo.pdf, doi: 10.1007/s10587-012-0008-7.

## Talks and poster

16. – 20. September 2024 **Bridging the Gap: Writing Portable Programs for CPU and GPU using CUDA**, *Conference talk, Cppcon 2024*, Denver, Colorado, USA
Thomas Mejstrik, Sebastian Woblistin

11. – 14. June 2024 **Common invariant cones of sets of matrices**, *Poster, ATMA 2024*, Lecce, Italy
Thomas Mejstrik, V. Yu. Protasov

9. March 2023 **Gretchenfrage: MATLAB/GNU Octave or Python? Handling programming languages in the Large Time Frequency Analysis Toolbox**, *Conference talk, DAGA 2023 - 49. Jahrestagung für Akustik*, Hamburg, Germany
Clara Hollomey, Nicki Holighaus, Peter Balazs, Thomas Mejstrik

20. – 24. June 2022 **A novel algorithm to compute the joint spectral radius –Feta flavoured Ipa**, *Invited talk, Curves & Surfaces 2022, Arcachon*, France

21. – 24. March 2022 **TTEST for Matlab and Octave: Unit testing scientific code**, *Conference talk, DAGA 2022 - 48. Jahrestagung für Akustik*, Stuttgart, Germany
Clara Hollomey, Thomas Mejstrik

14. March 2022 **A JSR primer and the feta flavoured ipa**, *Invited talk, Technical University Darmstadt, Höchst*, Germany

30. November 2021 **Multiple subdivision schemes and joint spectral radius**, *Invited talk, Lomonosov Moscow State University*, Russia

11. November 2021 **Elliptic polytopes and invariant norms of linear operators**, *Conference talk, ATMA 2021, Reggio Calabria*, Italy

26. – 30. August 2019 **Modified invariant polytope algorithm – Computing the JSR**, *Poster, ESI Workshop: Multivariate Approximation and Interpolation with Applications, Vienna*, Austria

2. April 2019 **Joint spectral radius and subdivision schemes**, *Invited talk, University of Passau*, Germany

4. – 8. March 2019, **Modified invariant polytope algorithm and t-toolboxes for Matlab**, *Conference talk, IM-Workshop 2019 on Signals, Images, and Approximation 2019, Bernried*, Germany

28. June – 4. July 2018, **Computing the joint spectral radius of large matrices: practical issues**, *Poster, 9th International Conference on Curves and Surfaces, Arcachon*, France

17. – 21. Sept. 2017 **Regularity of anisotropic subdivision**, *Conference talk, Second Conference on Subdivision, Geometric and Algebraic Methods, Isogeometric Analysis and Refinability, Gaeta*, Italy

23. – 26. April 2017 **M&M's Schemes**, *Conference talk, VDS Retreat Strobl 2017, Strobl*, Austria

14. March 2017 **Hinter dem Horizont, Komponistinnen aus der Türkei und dem Iran**, *Conference organizer, University of Music and Performing Arts Vienna*, Austria

27. Febr. – 3. March 2017 **Joint spectral radius and multiple subdivision**, *IM-Workshop 2017 on Signals, Images, and Approximation, University of Vienna*, Austria

12. October 2016 **Real-time computation and approximation error of frequency warped frames**, *Invited talk, WARPED Day (FLAME workshop), Acoustic Research Institute at the ÖAW*, Austria
Thomas Mejstrik, Gianpaolo Evangelista

24. September 2016 **Functional magnetic resonance imaging - Gender and sex**, *Conference talk, hmdw seminar*, Payerbach, Austria

8. March 2016 **Virtuosinnen**, *Conference organizer, University of Music and Performing Arts Vienna*, Austria

24. April 2015 **Hinter den Spiegeln, Geschlechterrollen und sexuelle Identitäten von Komponist_innen**, *Conference organizer, University of Music and Performing Arts Vienna*, Austria