

Adrian Kulmburg, Ph.D. Student

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Education




- 2020 –  **Ph.D., Technical University of Munich (TUM)**, Germany.
Supervisor: Prof. Dr. Matthias Althoff
- 2018 – 2019  **B.Sc. Physics, Federal Institute of Technology (ETH)** of Zurich, Switzerland.
Focus: Quantum Mechanics and Astrophysics.
- 2017 – 2018  **M.Sc. Mathematics, Federal Institute of Technology (ETH)** of Zurich, Switzerland.
Thesis title: *Viscosity Solutions for Generalized Level-Set Flows*.
Supervisor: Prof. Dr. Michael Struwe
- 2013 – 2017  **B.Sc. Mathematics, Federal Institute of Technology (ETH)** of Zurich, Switzerland.
Thesis title: *Tunnel's theorem for congruent numbers*.
Supervisor: Prof. Dr. Özlem Imamoglu

Research Publications



Journal Articles

- M. Wetzlinger, **A. Kulmburg**, and M. Althoff, “Inner approximations of reachable sets for nonlinear systems using the minkowski difference,” *IEEE Control Systems Letters*, vol. 8, pp. 2033–2038, 2024.  DOI: 10.1109/LCSYS.2024.3421194.
- M. Wetzlinger, **A. Kulmburg**, A. Le Penven, and M. Althoff, “Adaptive reachability algorithms for nonlinear systems using abstraction error analysis,” *Nonlinear Analysis: Hybrid Systems*, vol. 46, p. 101 252, 2022.  DOI: 10.1016/j.nahs.2022.101252.
- **A. Kulmburg** and M. Althoff, “On the co-NP-completeness of the zonotope containment problem,” *European Journal of Control*, vol. 62, pp. 84–91, 2021.  DOI: 10.1016/j.ejcon.2021.06.028.

Conference Proceedings




- **A. Kulmburg**, I. Brkan, and M. Althoff, “Search-based and stochastic solutions to the zonotope and ellipsotope containment problems,” in *2024 European Control Conference (ECC)*, 2024, pp. 1057–1064.  DOI: 10.23919/ECC64448.2024.10590884.
- M. Wetzlinger, V. Kotsev, **A. Kulmburg**, and M. Althoff, “Implementation of polyhedral operations in cora 2024,” in *Proceedings of the 11th Int. Workshop on Applied Verification for Continuous and Hybrid Systems*, vol. 103, EasyChair, 2024, pp. 163–181.  DOI: 10.29007/wb9s.
- M. Wetzlinger, **A. Kulmburg**, and M. Althoff, “Adaptive parameter tuning for reachability analysis of nonlinear systems,” in *Proceedings of the 24th International Conference on Hybrid Systems: Computation and Control*, Association for Computing Machinery, 2021.  DOI: 10.1145/3447928.3456643.

Under Review



- **A. Kulmburg**, L. Schäfer, and M. Althoff, “Approximability of the Containment Problem for Zonotopes and Ellipsotopes,” Submitted to *IEEE Transactions on Automatic Control*, 2024.  arXiv: 2404.11185.
- **A. Kulmburg**, “The Generalized Matrix Norm Problem,” Submitted to the *SIAM Journal on Matrix Analysis and Applications (SIMAX)*, 2023.  arXiv: 2310.00605.

Teaching




Lectures

- 2021 – 2023  **Main Organizer.** Technical University of Munich (TUM), Germany.
Orchestrated the logistics for the lecture *Techniques in Artificial Intelligence*.
- 2020 – 2023  **Instructor.** Technical University of Munich (TUM), Germany.
Organized the Logic section of the lecture *Techniques in Artificial Intelligence*.
- 2015 & 2019  **Teaching Assistant.** Federal Institute of Technology (ETH) of Zurich, Switzerland.
Prepared and held exercise sessions for the lecture *Numerical Methods*.


Student Projects

- 2021 – 2023  **Seminar – Cyber-Physical Systems**, advising students on literature research.
-  **Practical course – Verification, Controller Synthesis, and Design of Cyber-Physical Systems**, advising students on programming projects.



Student Theses Supervision

- 2020 –  **Master theses**, two at Technical University of Munich (TUM), Germany.
- 2020 –  **Bachelor theses**, four at Technical University of Munich (TUM), Germany.
- 2020 –  **Guided research**, one at Technical University of Munich (TUM), Germany.

Employment History


- 2011 & 2012  **Summer Internship**, F. Hoffmann-La Roche in Basel, Switzerland. Prepared the documentation of various molecular structures.

Skills


- Languages  French (native) – German (native) – English (fluent) – Russian (beginner)
- Coding  MATLAB (proficient) – ~~TeX~~TeX (proficient) – Python (proficient) – C (beginner) – C++ (beginner) – HTML/CSS (beginner)

Miscellaneous Experience



Initiatives

- 2021 –  **Women in CS @ TUM**, student group working towards equal participation and support of women and other under-represented groups. Member since 2021, and co-team lead since 2023.

Awards

- 2013  **German Physical Society (DPG) Book Price** for exceptional performances in Physics.

Committees & Organization

- 2022 –  **Deputy Gender Equality Officer (GEO)**, at Technical University of Munich.
Interview and selection process for associate professorships.
- 2022  **Summer CPS Workshop**, organization of a four-day workshop for CPS group in Sicily, Italy.

Miscellaneous Experience (continued)

2021



Summer CPS Workshop, organization of a four-day workshop for CPS group at Lake Garda, Italy.