Curriculum Vitae

Dr. rer. nat. Thomas Camminady

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Experience

Algorithm Developer

Wahoo Fitness LLC

Since 03/2021, Remote from Germany

- Development of algorithms for consumer sports devices and in-house R&D.
- Backend API development with Python and Pydantic, serving thousands of users, deployed via AWS.
- Collaboration with cloud engineers and frontend developers to ensure seamless integration and functionality.
- Using time series analysis, sensor fusion, uncertainty quantification, and machine learning; both for rapid prototyping and production-ready code.
- Analysis and visualization of distributed (user) data using pandas, numpy, plotly, and SQL.
- C-code generation for low-level hardware sensors (GNSS, barometer, gyroscope) using Matlab.
- Agile work environment in a fully remote team (US and EU) using Jira and Confluence.

Scientific Staff

Steinbuch Centre for Computing and **Center for CES**

04/2015 - 03/2021, Karlsruhe and Aachen, Germany

- Research in the field of kinetic theory, numerical mathematics, optimization, and machine learning.
- Application of machine learning tools to the optimization of numerical algorithms in CFD.
- Optimization of research software on KIT's HPC cluster via parameter studies using OpenMP.
- Teaching assistant and substitute lecturer for modules in the mathematics and CES programs.

Student Assistant

Center for CES

01/2010 - 03/2015, Aachen, Germany

- Helping with teaching duties for a variety of mathematics and computer science modules.
- Various CPU- and GPU-based research projects using C, Fortran, and CUDA.

Summer School on Plasmas

Festival de Théorie

06/2017 - 07/2017, Aix-en-Provence, France

- Active participation in seminars and workshops in the field of plasmas.
- Implementing magnetic field derivatives into a Fortran DG-MHD research code.

Internship with Bachelor's Thesis

EADS Cassidian

10/2012 - 04/2013, Manching, Germany

- Automation of UAV airfoil shape optimization using mesh adjoints.
- Numerical simulations with in-house tools and the adjoint code of the German Aerospace Center.

Education

Dr. rer. nat. in Applied Mathematics

Karlsruhe Institute of Technology

10/2017 - 01/2021, Karlsruhe, Germany

Thesis: *Theory, models, and numerical methods for classical and non-classical transport.*

Master of Science in Computational Engineering Science

RWTH Aachen University

10/2013 - 03/2015, Aachen, Germany

Thesis: *Theory and application of numerical methods for fractional diffusion equations.*

Bachelor of Science in Computational Engineering Science

RWTH Aachen University

10/2009 - 09/2013, Aachen, Germany

Thesis: *Improvement of the aerodynamic shape optimization by adjoint methods in an MDO process.*

Skills

Python

- 8 years of experience Expertise in OOP, typed Python, and advanced software design paradigms for robust software development and testing. Experience with NumPy, Scipy, pandas, matplotlib, and scikit.

Matlab

- 6 years of experience Development of scientific simulation tools and visualizations. Includes working with MuPAD, Simulink, and Optimization Toolbox.

Data Visualization

- 10+ years of experience Expert in creating interactive data visualizations and dashboards using Altair, Plotly, Matplotlib, D3.js, and Observable Plot to present complex data in an accessible way. This includes publication-ready visualizations, interactive visualizations for explorative analysis, and development of deployable dashboards.

Software Development

- 10+ years of experience Version control (git, Github), CI/CD, modern testing frameworks, proficiency with UNIX systems, AWS (Lambda), Jira, and Confluence.

Scientific Outreach

- Collaborator in the Computational and Mathematical Modeling Program (KIT University), developing programs that teach high-school and entry-level university students the importance of mathematical modeling for real-world applications.
- Publications in the (mathematical) didactical sciences, aiming at bringing mathematical modeling to the German Abitur.

Publications

0. **Mathematische Grundlagen der Künstlichen Intelligenz im Schulunterricht** *Mathematische Semesterberichte 69 (1), 73-101* Authors: Sarah Schönbrodt, **Thomas Camminady**, Martin Frank
1. **Theory, models, and numerical methods for classical and non-classical transport** *Dissertation*

2. **Ray Effect Mitigation for the Discrete Ordinates Method Using Artificial Scattering** *Nuclear Science and Engineering, Vol. 194, No. 11, pp. 971–988 (2020)* Authors: Martin Frank, Jonas Kusch, **Thomas Camminady**, Cory D. Hauck
3. **Vorschlag für eine Abiturprüfungsaufgabe mit authentischem und relevantem Realitätsbezug** *In: Modellierungskompetenzen – Diagnose und Bewertung, Springer Berlin Heidelberg, pp. 153–187 (2020)* Authors: Sube, Maike; **Thomas Camminady**; Martin Frank; Roeckerath, Christina
4. **Ray effect mitigation for the discrete ordinates method through quadrature rotation** *Journal of Computational Physics, Vol. 382, pp. 105–123 (2019)* Authors: **Thomas Camminady**, Martin Frank, Kerstin Küpper, Jonas Kusch
5. **Highly uniform quadrature sets for the discrete ordinates method** *In Proceedings of the International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (2019), pp. 25–29* Authors: **Thomas Camminady**, Martin Frank, Jonas Kusch
6. **A spectral Galerkin method for the fractional order diffusion and wave equation** *International Journal of Advances in Engineering Sciences and Applied Mathematics, Vol. 10, No. 1, pp. 90–104 (2018)* Authors: **Thomas Camminady**, Martin Frank
7. **A new high-order fluid solver for tokamak edge plasma transport simulations based on a magnetic-field independent discretization** *Contributions to Plasma Physics, Vol. 58, Nos. 6–8, pp. 688–695 (2018)* Authors: Giorgiani, G.; **Thomas Camminady**; Bufferand, H.; Ciraolo, G.; Ghendrih, P.; Guillard, H.; Heumann, H.; Nkonga, B.; Schwander, F.; Serre, E.; Tamain, P.
8. **Nonclassical particle transport in heterogeneous materials** *In Proceedings of the International Conference on Mathematics & Computational Methods Applied to Nuclear Science & Engineering (2017)* Authors: **Thomas Camminady**, Martin Frank, Edward W. Larsen
9. **The equivalence of forward and backward nonclassical particle transport theories** *In Proceedings of the International Conference on Mathematics & Computational Methods Applied to Nuclear Science & Engineering (2017)* Authors: Edward W. Larsen, Martin Frank, **Thomas Camminady**
10. **Theory and application of numerical methods for fractional diffusion equations** *Master's Thesis (2015)*
11. **Improvement of the aerodynamic shape optimization by adjoint methods in an MDO process** *Bachelor's Thesis (2013)*