

# LADISLAV TRNKA | CURRICULUM VITAE

## PERSONAL DETAILS

Gender: Male

Date of birth: 23.6.1999

Place of birth: Havlíčkův Brod, Czech Republic

Citizenship: Czech Republic

✉ Email: [trnka.ladis@gmail.com](mailto:trnka.ladis@gmail.com)

🐙 GitHub: [LadislavTrnka](https://github.com/LadislavTrnka)

🏠 Homepage: [ladislavtrnka.github.io](https://ladislavtrnka.github.io)

## RESEARCH INTERESTS

- Numerical methods for differential equations (spectral collocation method, finite element method)
- Nonlinear dynamical systems and bifurcation analysis
- Elastic solids, Newtonian and non-Newtonian fluids, viscoelastic fluids (numerical simulations, thermodynamics)
- Reduced-order models and machine learning for fluid mechanics

## EDUCATION

09/2025-present

Institute of Science and Technology Austria (ISTA)

PhD student

09/2022-06/2025

Charles University, Faculty of Mathematics and Physics

Master's degree with honours: **Mathematical Modelling in Physics and Technology**

Thesis title: *Bifurcation analysis of viscoelastic flows using deflation method*

Supervisor: Doc. Mgr. Vít Průša, Ph.D.

09/2019-06/2022

Charles University, Faculty of Mathematics and Physics

Bachelor's degree with honours: **Mathematical Modelling**

Thesis title: *Spectral collocation methods in solid mechanics*

Supervisor: Doc. Mgr. Vít Průša, Ph.D.

## PUBLICATIONS

[4] Vít Průša and **Ladislav Trnka**. Numerical bifurcation analysis using deflated continuation method—cross-slot flow of fene-cr viscoelastic fluid. *AIP Conference Proceedings*, 3400(1):020001, 2025. ISSN 0094-243X. doi:10.1063/5.0282408

[1] Vít Průša and **Ladislav Trnka**. Mechanical response of elastic materials with density dependent Young modulus. *Applications in Engineering Science*, 14:100126, 2023. ISSN 2666-4968. doi:10.1016/j.apples.2023.100126

### Preprints:

[3] Vít Průša, K. R. Rajagopal, Casey Rodriguez, **Ladislav Trnka**, and Martin Vejvoda. Modeling metamaterials by second-order rate-type constitutive relations between only the macroscopic stress and strain, 2025. URL <https://arxiv.org/abs/2502.10045>

[2] Jan Blechta, Vít Průša, **Ladislav Trnka**, and Karel Tůma. Fast construction of the discrete green operator for a second order ordinary differential equation, 2024. URL <https://arxiv.org/abs/2412.06242>

## RESEARCH EXPERIENCE

08-09/2025

**Scientific intern** at the Hof group, Prof. Björn Hof, Institute of Science and Technology Austria (ISTA).

02/2023-03/2025

**Team researcher**, *Mathematical analysis of partial differential equations describing far-from-equilibrium open systems in continuum thermodynamics*, Czech Science Foundation, EXPRO 20-11027X, Principal investigator Doc. RNDr. Miroslav Bulíček, Ph.D.

09-11/2022

**Principal investigator**, *Elastic bodies with density dependent material moduli*, Student Faculty Grants (individual short-term projects for students beyond normal study duties), Charles University, Faculty of Mathematics and Physics, research resulted in publication [1].

## AWARDS AND SCHOLARSHIPS

06/2025

**Professor Ivo Marek Award for Numerical and Computational Mathematics**, awarded by Nečas Center for Mathematical Modelling for outstanding study results and exceptional initiative in studying the aforementioned field at the Faculty of Mathematics and Physics, Charles University.

02/2024-05/2025    **UNCE MathMAC** (University Centre for Mathematical Modelling, Applied Analysis and Computational Mathematics at the Faculty of Mathematics and Physics, Charles University), scholarships for excellent PhD and master's students, the scholarship covered my travel costs and conference fees for 2023-2024.

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TEACHING EXPERIENCE

Winter 2024            Computer Solution of Continuum Physics Problems II (advanced course for master's students), two lectures and two tutorials on the deflation continuation algorithm, Charles University, Prague, Czech Republic.

Winter 2023            Computer Solution of Continuum Physics Problems II (advanced course for master's students), two lectures and two tutorials on the deflation continuation algorithm, Charles University, Prague, Czech Republic.

**My involvement:** I wrote **one section of lecture notes on the deflation continuation algorithm** (algorithm for numerical bifurcation analysis of stationary nonlinear equations) and led **two lectures and two tutorials**.

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CONFERENCES AND WORKSHOPS

2025                    *Novel Trends in Rheology X*, Faculty of Technology, Tomas Bata University in Zlín, July 30-31, Zlín, Czech Republic, on-site participant (**poster** 📄, *Bifurcation analysis of viscoelastic flows using deflation method*)

2024                    *Modelling, PDE Analysis and Computational Mathematics in Materials Science*, Faculty of Mathematics and Physics, Charles University, September 22-27, Prague, Czech Republic, on-site participant (**poster** 📄, *Bifurcation analysis of viscoelastic flows using deflation method*)

2024                    *CISM-EUROMECH Advanced Course, Model Reduction and Machine Learning for Solids, Fluids and Controls*, CISM (International Centre for Mechanical Sciences), September 9-13, Udine, Italy, on-site participant

2024                    *The von Karman Institute Lecture Series, Introduction to Quantum Computing in Fluid Dynamics*, the von Karman Institute for Fluid Dynamics, July 8-12, Brussels, Belgium, online participant

2024                    *High Performance Computing in Science and Engineering conference*, IT4Innovations National Supercomputing Center, VSB (Technical University of Ostrava), May 20-23, Karolinka, Czech Republic, on-site participant (**poster** 📄, *Bifurcation analysis of viscoelastic flows using deflation method*)

2024                    *EMS School, Mathematical Aspects of Fluid Flows*, EMS (European Mathematical Society), Faculty of Mathematics and Physics, Charles University, May 12-17, Kácov, Czech Republic, on-site participant (**contributed talk** 🗣️)

2024                    *The von Karman Institute Lecture Series, Machine Learning for Fluid Mechanics: Analysis, Modeling, Control and Closures*, Université libre de Bruxelles, January 29-February 2, Brussels, Belgium, on-site participant

2023                    *CISM Advanced Course, Machine Learning for Fluid Mechanics*, CISM (International Centre for Mechanical Sciences), July 10-14, Udine, Italy, on-site participant

2023                    *EMS School in Mathematical Modelling, Numerical Analysis and Scientific Computing*, EMS (European Mathematical Society), Faculty of Mathematics and Physics, Charles University, May 28-June 2, Kácov, Czech Republic, on-site participant

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PROGRAMMING SKILLS

Python (mpi4py basics), C (OpenMP and OpenMPI basics), Firedrake and FEniCS (defcon library), MATLAB (chebfun package), Wolfram Mathematica

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LANGUAGE SKILLS

English (C1), Czech (native)

Certificate:

7/12/2024            IELTS Academic test (International English Language Testing System), Overall Band Score **7.5** (CEFR C1)

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REFERENCES

<b>Prof. RNDr. Josef Málek, CSc.</b> Email: malek@karlin.mff.cuni.cz Mathematical Institute of Charles University Sokolovská 83, 186 75 Praha 8 Czech Republic	<b>Doc. Mgr. Vít Průša, Ph.D.</b> Email: prusv@karlin.mff.cuni.cz Mathematical Institute of Charles University Sokolovská 83, 186 75 Praha 8 Czech Republic	<b>Prof. Ing. Jan Zeman, Ph.D.</b> Email: jan.zeman@cvut.cz Faculty of Civil Engineering Czech Technical University in Prague Thákurova 7, 166 29 Prague 6 Czech Republic
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