Florian Oschmann

Curriculum Vitae

Personal data

First name	Florian
Family name	Oschmann
Date of birth	19.03.1995
Place of birth	Friedrichroda, Germany
Nationality	German
Email	oschmann@math.cas.cz
Homepage	`https://florian-oschmann.github.io/`

Recent employment

since 07/2022 **Postdoctoral fellow**, *Akademie Věd České Republiky*, Praha
Department of Evolutionary Differential Equations; Head of group: Šárka Nečasová

Education

2018–2022 **Ph.D. in Mathematics**, *TU Dortmund*, Dortmund
Title of PhD thesis: Homogenization of compressible fluids in perforated domains;
Supervisor: Prof. Dr. Peter Bella, *Final grade: magna cum laude (very good)*

2017–2019 **B.Sc. in Physics**, *Universität Leipzig*, Leipzig, *Final grade: 1.6*

2013–2018 **Graduate Mathematician (Diplom-Mathematiker)**, *Universität Leipzig*, Leipzig, *Final grade: 1.2*
Title of Diploma thesis: Über die Joukowski-Abbildung und ihre Anwendungen in der Aerostatik (On the Joukowski mapping and its applications in aerostatics);
Supervisor: Prof. Dr. Hans-Peter Gittel

2005–2013 **High School Diploma (Abitur)**, *Perthes-Gymnasium*, Friedrichroda, Germany, *Final grade: 1.1*

Employment history

2019–2022 **Ph.D. student**, *TU Dortmund*, Dortmund

2018–2019 **Ph.D. student**, *Universität Leipzig*, Leipzig

Teaching Experience

Summer 2025 **Tutor of exercise classes for Bachelor students**, Karlova Univerzita, Praha
Mathematical Analysis 1 (in English)

Summer 2022 **Tutor of exercise classes for Bachelor students**, TU Dortmund
Analysis II

Winter 2021/22 **Consultant in Masterseminar**, *Homogenization of compressible Navier–Stokes–Fourier equations*, TU Dortmund

Supervisor: Prof. Dr. Peter Bella

2020–2022 **Tutor and organization of exercise classes for Analysis I-III**, TU Dortmund

Lecturer: Prof. Dr. Peter Bella

2019–2020 **Tutor of exercise classes for Bachelor students**, TU Dortmund

Analysis II (Summer 2020)

Analysis I (Winter 2019/2020)

2016–2019 **Tutor of exercise classes for Diploma and Bachelor students**, Universität Leipzig

Mathematik 4 für Physiker (in English) (Summer 2019)

Mathematik 3 für Physiker (in English) (Winter 2018/2019)

Gewöhnliche Differentialgleichungen LA Gymnasien (Summer 2018)

Analysis für Lehramt Grund- und Oberschule (Winter 2017/2018)

Mathematik für Wirtschaftswissenschaftler 2 (Summer 2017)

Gewöhnliche Differentialgleichungen (Winter 2016/2017)

Languages

German native

English fluently

Czech intermediate (B1 level)

Grants

2023–2025 **Czech Academy of Sciences**, Programme to support prospective human resources - project L100192351 "Compressible fluids: asymptotic behavior, fluids with structure, related problems", main investigator

2022–2024 **Czech Science Foundation**, project GA22-01591S "Mathematical theory and numerical analysis for equations of viscous newtonian compressible fluids", team member (main investigator: Šárka Nečasová)

Research activities

Organizing committee

07.04.–11.04.2025 **GAMM25**, *Poznań, Poland*, co-organizer of Minisymposium "Mathematical analysis of interacting particles", together with Iulia Cristian

20.08.–25.08.2023 **ICIAM23**, *Tokyo, Japan*, co-organizer of Minisymposium "Limit behavior and asymptotic properties in fluid mechanics", together with Thomas Eiter

Participation in workshops and conferences

29.09.–01.10.2025 "Mathematical Analysis of Fluid Flows by Variational Methods" (Berlin, Germany)

14.09.–17.09.2025 "Hydrodynamic models and multi-scale analysis in PDEs" (Warszawa, Poland)

25.08.–29.08.2025 Summer School "Rotation and Fluids" (Praha, Czech republic)

23.06.–24.06.2025 Workshop "MathGarage: Variations" (Warszawa, Poland)

02.06.–06.06.2025 Mathematics with Applications 2025, on the occasion of the 60th Birthday of Professor Šárka Nečasová (Funchal, Portugal)

07.04.–11.04.2025 GAMM25 (Poznań, Poland; co-organizer of Minisymposium "Mathematical analysis of interacting particles")

13.01.–17.01.2025 Third Chinese-Czech Conference on Mathematical Fluid Mechanics (Xi'an, China)

08.01.–10.01.2025 Fluids @PoliMi (Milano, Italy)

19.08.–23.08.2024 Mathematical Fluid Mechanics In 2024 (Praha, Czech republic)

17.06.–21.06.2024 EVEQ 2024, NextGen (Praha, Czech republic)

12.05.–17.05.2024 EMS School "Mathematical Aspects of Fluid Flows" (Kácov, Czech republic)

19.03.–22.03.2024 Multi-scale methods for reactive flow and transport in complex elastic media; Conference in memory of prof. Andro Mikelić (Dubrovnik, Croatia)

11.12.–13.12.2023 RIMS Workshop on Mathematical Analysis of Viscous Incompressible Fluid (Kyoto, Japan)

07.12.–08.12.2023 Recent Topics on the Mathematical Fluid Mechanics (Tokyo, Japan)

20.08.–25.08.2023 ICIAM23 (Tokyo, Japan; co-organizer of Minisymposium "Limit behavior and asymptotic properties in fluid mechanics")

26.06.–30.06.2023 Shocking Developments: New Directions in Compressible and Incompressible Flows: A Conference in Honor of Alexis Vasseur's 50th Birthday (Leipzig, Germany)

12.06.–16.06.2023 Biomedical Fluid Mechanics (Praha, Czech republic)

30.05.–02.06.2023 GAMM23 (Dresden, Germany)

18.10.–22.10.2022 Against the flow (Będlewo, Poland)

22.08.–26.08.2022 Mathematical Fluid Mechanics In 2022 (Praha, Czech republic)

11.07.–15.07.2022 Equadiff 15 (Brno, Czech republic)

23.08.–27.08.2021 Summer School "Fluids under Control" (Praha, Czech republic; online)

22.02.–26.02.2021 Winterschool on Analysis and Applied Mathematics (Münster, Germany; online)

15.02.–19.02.2021 Multi-scale Analysis: Thematic Lectures and Meeting (Bengaluru, India; online)

2020–2022 One World PDE Seminar (Bath, UK; online)

17.06.–21.06.2019 Progress in Mathematical Fluid Dynamics (Cetraro, Italy)

10.06.–14.06.2019 International Conference on Fluids and Variational Methods (Budapest, Hungary)

03.06.–06.06.2019 Material theories, statistical mechanics, and geometric analysis: A conference in honor of Stephan Luckhaus' 66th birthday (Leipzig, Germany)

Invited talks

09.2025 **Per aquam ad astra: On stars (and) boiling water**, *Hydrodynamic models and multi-scale analysis in PDEs*, University of Warszawa, Warszawa

23.06.2025 **Fall in Summer: Does a rigid body touch the ground?**, *Workshop "MathGarage: Variations"*, University of Warszawa, Warszawa

13.12.2024 **Introduction to homogenization for Navier-Stokes equations**, *Seminar "Funktionenräume"*, Friedrich-Schiller-Universität, Jena

05.09.2024 **Overview on homogenization for Navier-Stokes equations**, Nanjing University, Nanjing

27.11.2023 **Some insights in homogenization of compressible Navier-Stokes equations**, Polish Academy of Sciences, Warszawa

24.04.2023 **Singular limits for stratified fluids**, Polish Academy of Sciences, Warszawa

31.01.2023 **Stratified fluids: On pancakes and non-local temperatures**, University of Hradec Králové, Hradec Králové

18.01.2023 **Stratified fluids: On pancakes and non-local temperatures**, *Langenbach-Seminar*, WIAS Berlin, Berlin

09.11.2022 **An unexpected term for the Oberbeck–Boussinesq approximation**, *Séminaire EDP*, Université Paris Cité, Paris

Scientific talks

09.2025 **Γ-convergence for some nearly incompressible fluids**, *MAFF 2025*, WIAS Berlin, Berlin

03.06.2025 **Darcy's law for inhomogeneous incompressible flows**, *Mathematics with Applications 2025*, University of Madeira, Funchal

08.04.2025 **Darcy's law for inhomogeneous incompressible flows**, *GAMM25*, Poznań University of Technology, Poznań

21.01.2025 **Quantitative derivation of Darcy's law for fluids of Carreau-Yasuda type**, Hefei University of Technology, Hefei

14.01.2025 **Quantitative derivation of Darcy's law for fluids of Carreau-Yasuda type**, *Third Chinese-Czech Conference on Mathematical Fluid Mechanics*, Xi'an Jiaotong University, Xi'an

22.08.2024 **Quantitative derivation of Darcy's law for fluids of Carreau-Yasuda type**, *MFM-IN 2024*, Czech Academy of Sciences, Praha

18.06.2024 **Oberbeck-Boussinesq and the boundary issue**, *EVEQ 2024, NextGen*, Czech Academy of Sciences, Praha

13.05.2024 **Collision of rigid bodies in a non-Newtonian fluid**, *EMS School "Mathematical Aspects of Fluid Flows"*, Kácov

21.03.2024 **Γ-convergence for nearly incompressible fluids**, *Multi-scale methods for reactive flow and transport in complex elastic media; Conference in memory of prof. Andro Mikelić*, Centre for Advanced Academic Studies, Dubrovnik

15.03.2024 **Rigorous derivation of magneto-Boussinesq approximation with non-local term**, Polish Academy of Sciences, Warszawa

09.12.2023 **Homogenization and singular limits for compressible fluids**, Waseda University, Tokyo

23.08.2023 **Γ-convergence for nearly incompressible fluids**, *ICIAM23*, Minisymposium "Limit behavior and asymptotic properties in fluid mechanics", Tokyo

12.06.2023 **On (no) collision of a falling solid in a compressible fluid**, *Biomedical Fluid Mechanics*, Czech Academy of Sciences, Praha

30.05.2023 **Γ-convergence for nearly incompressible fluids**, *GAMM23*, Young Researcher's Minisymposium "Emergent behaviour in systems of hydrodynamically interacting particles", Dresden

02.05.2023 **Some insights in homogenization of compressible Navier-Stokes equations**, *Seminar on Partial Differential Equations*, Czech Academy of Sciences, Praha

13.03.2023 **Some insights in homogenization of compressible Navier-Stokes equations**, *Nečas Seminar on Continuum Mechanics*, Charles University, Praha

19.10.2022 **Results on (no) collision of a falling solid in a compressible fluid**, *Against the flow*, Polish Academy of Sciences / Będlewo conference center, Będlewo

04.10.2022 **An unexpected term for the Oberbeck–Boussinesq approximation**, *Seminar on Partial Differential Equations*, Czech Academy of Sciences, Praha

25.08.2022 **Homogenization of compressible fluids in porous media**, *MFM-IN 2022*, Czech Academy of Sciences, Praha

11.07.–15.07.2022 **Homogenization of compressible NSE in randomly punctured domains**, *Equadiff 15*, Masaryk university, Brno
Poster

08.09.2021 **Inverse of divergence and homogenization of compressible Navier-Stokes equations in randomly perforated domains**, *Seminar on Partial Differential Equations*, Czech Academy of Sciences, Praha

Research visits

01.09.–13.09.2024 **Nanjing University, Nanjing**, collaboration with Yong Lu

28.02.–15.03.2024 **Polish Academy of Sciences, Warszawa**, collaboration with Aneta Wróblewska-Kamińska and Piotr Gwiazda

13.11.–01.12.2023 **Polish Academy of Sciences, Warszawa**, collaboration with Aneta Wróblewska-Kamińska and Piotr Gwiazda

21.04.–28.04.2023 **Polish Academy of Sciences, Warszawa**, collaboration with Aneta Wróblewska-Kamińska

30.01.–03.02.2023 **University of Hradec Králové**, collaboration with Andrii Khrabustovskyi

16.01.–20.01.2023 **WIAS Berlin**, collaboration with Thomas Eiter

07.11.–11.11.2022 **IMJ-PRG, Université Paris Cité**, collaboration with Richard Höfer

06.09.–09.09.2021 **Czech Academy of Sciences, Praha**, collaboration with Peter Bella and Eduard Feireisl

Publications and Preprints

Research interests

partial differential equations, homogenization of Navier–Stokes and Navier–Stokes–Fourier equations, singular limits, fluid–structure interaction, collision problems

Publications

1. **Collision/No-collision results of a solid body with its container in a 3D compressible viscous fluid (2025)**
   Bumja Jin, Šárka Nečasová, Florian Oschmann, and Arnab Roy; published in "Journal of Differential Equations"; `https://doi.org/10.1016/j.jde.2025.01.057`
2. **A collision result for both non-Newtonian and heat conducting Newtonian compressible fluids (2024)**
   Šárka Nečasová and Florian Oschmann; published in "Proceedings of the Royal Society of Edinburgh Section A: Mathematics"; `https://doi.org/10.1017/prm.2024.5`
3. **On two Kuznetsov's conjectures (2023)**
   Florian Oschmann; published in "Examples and Counterexamples"; `https://doi.org/10.1016/j.exco.2023.100127`
4. **Homogenization of the unsteady compressible Navier-Stokes equations for adiabatic exponent $\gamma > 3$ (2023)**

Florian Oschmann and Milan Pokorný; published in "Journal of Differential Equations"; https://doi.org/10.1016/j.jde.2023.08.040

5. **Γ-convergence for nearly incompressible fluids (2023)**
   Peter Bella, Eduard Feireisl, and Florian Oschmann; published in "Journal of Mathematical Physics"; https://doi.org/10.1063/5.0138650
6. **Rigorous Derivation of the Oberbeck-Boussinesq Approximation Revealing Unexpected Term (2023)**
   Peter Bella, Eduard Feireisl, and Florian Oschmann; published in "Communications in Mathematical Physics"; https://doi.org/10.1007/s00220-023-04823-5
7. **Homogenization of the two-dimensional evolutionary compressible Navier-Stokes equations (2023)**
   Šárka Nečasová and Florian Oschmann; published in "Calculus of Variations and Partial Differential Equations"; https://doi.org/10.1007/s00526-023-02526-2
8. **On the incompressible limit of a strongly stratified heat conducting fluid (2023)**
   Danica Basarić, Peter Bella, Eduard Feireisl, Florian Oschmann, and Edriss S. Titi; published in "Journal of Mathematical Fluid Mechanics"; https://doi.org/10.1007/s00021-023-00791-x
9. **Inverse of Divergence and Homogenization of Compressible Navier–Stokes Equations in Randomly Perforated Domains (2023)**
   Peter Bella and Florian Oschmann; published in "Archive for Rational Mechanics and Analysis"; https://doi.org/10.1007/s00205-023-01847-y
10. **Homogenization of compressible fluids in perforated domains (2022)**
    Florian Oschmann (PhD thesis) http://dx.doi.org/10.17877/DE290R-22795
11. **Homogenization and low Mach number limit of compressible Navier-Stokes equations in critically perforated domains (2022)**
    Peter Bella and Florian Oschmann; published in "Journal of Mathematical Fluid Mechanics"; https://doi.org/10.1007/s00021-022-00707-1
12. **Homogenization of the full compressible Navier-Stokes-Fourier system in randomly perforated domains (2022)**
    Florian Oschmann; published in "Journal of Mathematical Fluid Mechanics"; https://doi.org/10.1007/s00021-022-00679-2

Preprints

1. **Brinkman's law as Γ-limit of compressible low Mach Navier-Stokes equations and application to randomly perforated domains (2025)**
   Peter Bella, Friederike Lemming, Roberta Marziani, and Florian Oschmann; https://arxiv.org/abs/2505.11213
2. **Rigorous derivation of magneto-Oberbeck-Boussinesq approximation with non-local temperature term (2025)**
   Piotr Gwiazda, Florian Oschmann, and Aneta Wróblewska-Kamińska; https://arxiv.org/abs/2504.13525
3. **Qualitative derivation of a density dependent incompressible Darcy law (2025)**
   Danica Basarić, Florian Oschmann, and Jiaojiao Pan; https://arxiv.org/abs/2502.14602
4. **To collide, or not to collide, that is the question - a survey (2024)**
   Florian Oschmann; lecture notes; https://arxiv.org/abs/2408.00010
5. **Qualitative/quantitative homogenization of some non-Newtonian flows in perforated domains (2024)**
   Yong Lu and Florian Oschmann; https://arxiv.org/abs/2406.17406
6. **Quantitative homogenization of the compressible Navier-Stokes equations towards Darcy's law (2024)**
   Richard M. Höfer, Šárka Nečasová, and Florian Oschmann; accepted in "Annales de l'Institut Henri

Poincaré, Analyse Non Linéaire" ; https://arxiv.org/abs/2403.12616

Prague, July 1, 2025