Curriculum Vitae

Simon Markfelder

Contact Information

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Career

since Sept. 2024	Juniorprofessor for *Partial Differential Equations in Mathematical Physics*, University of Konstanz, Germany
Apr. 2024 - Aug. 2024	Postdoctoral Researcher, University of Würzburg, Germany, Funded by DFG priority programme SPP 2410 *Hyperbolic Balance Laws in Fluid Mechanics: Complexity, Scales, Randomness (CoScaRa)*
Apr. 2023 - Mar. 2024	Postdoctoral Researcher, University of Würzburg, Germany, Feodor Lynen Return Fellowship of the *Alexander von Humboldt* Foundation
Nov. 2022 - Mar. 2023	*Parental Leave*
Nov. 2021 *(Offer declined)*	Offer of a tenure-track postdoctoral fellowship, University of Oslo, Norway
Nov. 2020 - Oct. 2022	Postdoctoral Researcher, University of Cambridge, UK, Feodor Lynen Research Fellowship of the *Alexander von Humboldt* Foundation, Postdoc Advisor: Prof. Edriss S. Titi

Academic Education

Jan. 2017 - Oct. 2020	PhD studies of Mathematics, University of Würzburg, Germany
	Degree: Dr. rer. nat.
	Final grade: Summa cum laude
	Thesis: *Convex Integration Applied to the Multi-Dimensional Compressible Euler Equations*
	Advisor: Prof. Christian Klingenberg
	Co-Advisor: Prof. Eduard Feireisl

Oct. 2014 - Dec. 2016	Studies of Mathematics (Master programme), University of Würzburg, Germany	
	Degree:	Master of Science
	Final grade:	1.0
	Thesis:	*On Uniqueness of Solutions to the Two-Dimensional Compressible Euler Equations*
	Advisor:	Prof. Christian Klingenberg
May 2011 - Sept. 2014	Studies of Mathematical Physics (Bachelor programme), University of Würzburg, Germany	
	Degree:	Bachelor of Science
	Final grade:	1.1

Languages

- German (native)
- English (fluent)

Grants

Apr. 2024 - Mar. 2027	Project within DFG priority programme SPP 2410 *Hyperbolic Balance Laws in Fluid Mechanics: Complexity, Scales, Randomness (CoScaRa)*	$\sim$ € 250k

Awards

July 2021	*Otto-Volk-Medal* of the mathematical institute of the University of Würzburg for one of the best PhD theses in Mathematics
May 2021	Award of the *Unterfränkische Gedenkjahrstiftung* and the University of Würzburg for one of the best PhD theses

Publications

Summary

- 1 Monograph
- 11 Articles in Peer-Reviewed Journals
- 1 Article in Peer-Reviewed Conference Proceedings
- 120 citations in 85 publications (according to MathSciNet)
- 219 citations (according to Google Scholar)

Monograph

[1] **S. Markfelder**: *Convex Integration Applied to the Multi-Dimensional Compressible Euler Equations.* Springer Lecture Notes in Mathematics 2294, Springer (2021), DOI: 10.1007/978-3-030-83785-3

Articles in Peer-Reviewed Journals

[2] **S. Markfelder**: *A New Convex Integration Approach for the Compressible Euler Equations and Failure of the Local Maximal Dissipation Criterion.* Nonlinearity 37(11), 1-60 (2024), DOI: 10.1088/1361-6544/ad81c8

[3] D. W. Boutros, **S. Markfelder**, E. S. Titi: *Nonuniqueness of generalised weak solutions to the primitive and Prandtl equations.* J. Nonlinear Sci. 34(4), Article Number 68 (2024), DOI: 10.1007/s00332-024-10032-8

[4] D. W. Boutros, **S. Markfelder**, E. S. Titi: *On Energy Conservation for the Hydrostatic Euler Equations: An Onsager Conjecture.* Calc. Var. Partial Differential Equations 62(8), Article Number 219 (2023), DOI: 10.1007/s00526-023-02558-8

[5] E. Feireisl, C. Klingenberg, **S. Markfelder**: *Euler system with a polytropic equation of state as a vanishing viscosity limit.* J. Math. Fluid Mech. 24, Article Number 67 (2022), DOI: 10.1007/s00021-022-00690-7

[6] C. Klingenberg, O. Kreml, V. Mácha, **S. Markfelder**: *Shocks make the Riemann problem for the full Euler system in multiple space dimensions ill-posed.* Nonlinearity 33(12), 6517-6540 (2020), DOI: 10.1088/1361-6544/aba3b2

[7] E. Feireisl, C. Klingenberg, **S. Markfelder**: *On the density of wild initial data for the compressible Euler system.* Calc. Var. Partial Differential Equations 59(5), Article Number 152 (2020), DOI: 10.1007/s00526-020-01806-5

[8] H. Al Baba, C. Klingenberg, O. Kreml, V. Mácha, **S. Markfelder**: *Nonuniqueness of admissible weak solution to the Riemann problem for the full Euler system in two dimensions.* SIAM J. Math. Anal. 52(2), 1729-1760 (2020), DOI: 10.1137/18M1190872

[9] E. Feireisl, C. Klingenberg, O. Kreml, **S. Markfelder**: *On oscillatory solutions to the complete Euler system.* J. Differential Equations 269(2), 1521-1543 (2020), DOI: 10.1016/j.jde.2020.01.018

[10] E. Feireisl, C. Klingenberg, **S. Markfelder**: *On the low Mach number limit for the compressible Euler system.* SIAM J. Math. Anal. 51(2), 1496-1513 (2019), DOI: 10.1137/17M1131799

[11] C. Klingenberg, **S. Markfelder**: *Non-uniqueness of energy-conservative solutions to the isentropic compressible two-dimensional Euler equations.* J. Hyperbolic Differ. Equ. 15(4), 721-730 (2018), DOI: 10.1142/S0219891618500224

[12] C. Klingenberg, **S. Markfelder**: *The Riemann problem for the multidimensional isentropic system of gas dynamics is ill-posed if it contains a shock.* Arch. Ration. Mech. Anal. 227(3), 967-994 (2018), DOI: 10.1007/s00205-017-1179-z

Articles in Peer-Reviewed Conference Proceedings

[13] C. Klingenberg, **S. Markfelder**: *Non-uniqueness of entropy-conserving solutions to the ideal compressible MHD equations.* In: "Hyperbolic Problems: Theory, Numerics, Applications", AIMS Series on Applied Mathematics Vol. 10, 491-498 (2020), Link: `www.aimsciences.org/book/AM/volume/26`

Conferences, Seminars and Workshops with Contribution

Abbreviations: (IT) = invited talk; (CT) = contributed talk; (P) = poster presentation

Upcoming

Sept. 2025 (IT)	Summer School *Advances in Hyperbolic Balance Laws*, Hirschegg, Austria

Past

Sept. 2024 (IT)	1st Young Scientists Retreat of the DFG priority programme SPP 2410 (CoScaRa), Hirschegg, Austria
July 2024 (IT)	Minisymposium *Geophysical and Fluid Modelling with PDEs* at the *XLIV Dynamics Days Europe*, Bremen, Germany
July 2024 (IT)	Workshop *Model Hierarchies in Atmosphere, Ocean and Climate Sciences*, Oberwolfach, Germany
June 2024 (IT)	Workshop *Analysis of Dissipation in Compressible and Inviscid Fluid Dynamics*, University of Konstanz, Germany
May 2024 (IT)	Webinar of the DFG priority programme SPP 2410, Stuttgart, Germany
Mar. 2024 (IT)	Minisymposium related to DFG priority programme SPP 2410 at the 94th Annual Meeting of the *Association of Applied Mathematics and Mechanics (GAMM)*, Magdeburg, Germany
Nov. 2023 (IT)	Oberseminar *Mathematische Strömungsmechanik*, University of Würzburg, Germany
Apr. 2023 (P)	Network Meeting of the *Alexander von Humboldt* Foundation, Mainz, Germany
Nov. 2022 (IT)	Oberseminar *Mathematische Strömungsmechanik*, University of Würzburg, Germany
June 2022 (CT)	XVIII International Conference on Hyperbolic Problems: Theory, Numerics, Applications, Málaga, Spain
Feb. 2022 (IT)	*Geometric Analysis and Partial Differential Equations* Seminar, University of Cambridge, United Kingdom
Nov. 2021 (P)	Network Meeting of the *Alexander von Humboldt* Foundation, Köln, Germany
Apr. 2021 (IT)	Workshop *Modeling Phenomena from Nature by Hyperbolic Partial Differential Equations*, Oberwolfach, Germany

Mar. 2021 (IT)	*Nonlinear PDEs* Seminar, Texas A&M University, Texas, U.S.A.
Jan. 2020 (IT)	*Berlin-Prague Workshop*, Czech Academy of Sciences, Prague, Czech Republic
Dec. 2019 (IT)	Minisymposium *Convex integration applied to the equations of fluid mechanics* at the *SIAM Conference on Analysis of Partial Differential Equations*, La Quinta, California, U.S.A.
Aug. 2019 (IT)	Workshop *Convex Integration in PDEs, Geometry, and Variational Calculus*, Banff International Research Station, Canada
Feb. 2019 (CT)	Symposium *Transport, Mixing and Fluids*, Münster University, Germany
Nov. 2018 (IT)	Forschungseminar, Ulm University, Germany
Oct. 2018 (IT)	Fall School *Hyperbolic Conservation Laws and Mathematical Fluid Dynamics*, University of Würzburg, Germany
Mar. 2018 (IT)	*Partial Differential Equations* Seminar, Czech Academy of Sciences, Prague, Czech Republic
Sept. 2017 (IT)	*Poitiers-Prague-Würzburg Workshop on PDEs*, Czech Academy of Sciences, Prague, Czech Republic
Feb. 2017 (P)	Workshop *Ideal Fluids and Transport*, Polish Academy of Sciences, Warsaw, Poland

Organization of Workshops and Minisymposia

Dec. 2019	Co-organizer of the minisymposium *Convex integration applied to the equations of fluid mechanics* at the *SIAM Conference on Analysis of Partial Differential Equations*, La Quinta, California, U.S.A.

Participation in Summer Schools and Conferences Without Contribution

Oct. 2023	Oberwolfach Seminar *Recent Topics on the Navier-Stokes Equations*, Oberwolfach, Germany
Jan. - June 2022	Program *Mathematical Aspects of Turbulence: Where do we stand?*, Isaac Newton Institute, Cambridge, United Kingdom
Nov. 2021	Workshop *Convex Integration and Nonlinear Partial Differential Equations*, Edinburgh, United Kingdom
May 2021	Oberwolfach Seminar *Introduction to Convex Integration*, Oberwolfach, Germany
May 2019	EMS School in Applied Mathematics *Mathematical Aspects of Fluid Flows*, Kácov, Czech Republic
Dec. 2017	Conference *Prague Compressible Meeting*, Czech Academy of Sciences, Prague, Czech Republic

Referee Activity

I have been a referee for the following journals.

- J. Differential Equations
- J. Math. Phys.
- SIAM J. Math. Anal.
- Nonlinearity
- Nonlinear Anal. Real World Appl.
- Comm. Partial Differential Equations
- Rev. Mat. Iberoam.
- Commun. Appl. Math. Comput.

Long Term Academic Stays

Feb. - Mar. 2018 — Institute of Mathematics of the Czech Academy of Sciences, Prague, Czech Republic
- One month stay
- Host: Prof. Eduard Feireisl

Aug. - Oct. 2016 — Centre for Applicable Mathematics of the Tata Institute of Fundamental Research, Bangalore, India
- Two months stay
- Supported by the DAAD program *A new Passage to India*

Sept. 2014 - Feb. 2015 — University of Padova, Italy
- One semester abroad
- Supported by the Erasmus+ program of the European Union

Teaching Record

Lectures

- As juniorprofessor at the University of Konstanz, Germany:

  Winter 2024/25 (upcoming) — Hyperbolic Conservation Laws (Master)

- As postdoc (complete organization and realization of lectures and exercise classes, as well as the final exam) at the University of Würzburg, Germany:

  Summer 2023 — Mathematical Continuum Mechanics (Master)

Supervision

- *since Sept. 2024* — *Valentin Pellhammer*, postdoc, University of Konstanz, Germany
  - Funded by DFG priority programme SPP 2410 *Hyperbolic Balance Laws in Fluid Mechanics: Complexity, Scales, Randomness (CoScaRa)*
  - Topic: *Convex integration: towards a mathematical understanding of turbulence, Onsager conjectures and admissibility criteria*
- *since June 2021* — *Daniel W. Boutros*, PhD student, University of Cambridge, United Kingdom
  - Co-supervised by myself
  - Main supervisor: Edriss S. Titi
  - Topic: *Onsager Conjectures in Mathematical Fluid Mechanics*

Exercise classes and tutorials

- As supervisor (discuss exercises with students and mark exercise sheets) at King's College, University of Cambridge, United Kingdom:

  Michaelmas 2021 Analysis and Topology (Undergraduate)

- As teaching assistant (teaching exercise groups as well as organizing the exercise classes) at the University of Würzburg, Germany:

  Summer 2020 Analysis 2 (Bachelor)
  Winter 2019/20 Analysis 1 (Bachelor)
  Summer 2019 Linear Algebra 1 (Bachelor)
  Winter 2018/19 Introduction to Partial Differential Equations (Bachelor) (at the level of Evans' *Partial Differential Equations*)
  Summer 2018 Linear Algebra 2 (Bachelor)
  Winter 2017/18 Linear Algebra 1 (Bachelor)
  Summer 2017 Analysis 2 (Bachelor)
- As student assistant (teaching exercise groups) at the University of Würzburg:

  Summer 2016 Linear Algebra 2 (Bachelor)
  Winter 2015/16 Linear Algebra 1 (Bachelor)
  Summer 2014 Mathematics for Students of Physics (Bachelor)

Summer schools etc.

- *September 2025 (upcoming)* — Lecturer at the summer school on *Advances in Hyperbolic Balance Laws* in Hirschegg, Austria
  - Duration: One week
  - Topic: Convex integration
- *September 2024* — Lecturer at the 1st Young Scientists Retreat of the DFG priority programme SPP 2410 (CoScaRa) in Hirschegg, Austria
  - Short course (two sessions)
  - Title: *Introduction to convex integration in the context of mathematical fluid dynamics*
- *August 2021* — Course instructor at the summer academy of the German Academic Scholarship Foundation (*Studienstiftung des deutschen Volkes*) in Leysin, Switzerland
  - Duration: Two weeks
  - Topic: Hyperbolic conservation laws
- *October 2018* — Lecturer at the fall school on *Hyperbolic Conservation Laws and Mathematical Fluid Dynamics* at the University of Würzburg, Germany
  - Short course (three sessions)
  - Title: *Lack of uniqueness for the multi-dimensional compressible Euler equations*

References

- Prof. Christian Klingenberg, University of Würzburg
  Relation: PhD Advisor
  Website: `ifm.mathematik.uni-wuerzburg.de/∼klingen/`
- Prof. Eduard Feireisl, Czech Academy of Sciences
  Relation: PhD Co-Advisor
  Website: `www.math.cas.cz/index.php/members/researcher/37`
- Prof. Edriss S. Titi, University of Cambridge and Texas A&M University and Weizmann Institute of Science
  Relation: Postdoc Advisor
  Website: `www.damtp.cam.ac.uk/person/est42` or `www.math.tamu.edu/∼titi/`
- Prof. Emil Wiedemann, Friedrich-Alexander University of Erlangen-Nürnberg
  Website: `en.www.math.fau.de/analysis-2/people/prof-dr-emil-wiedemann/`

18 October 2024