Curriculum Vitae
Sebastian Schwarzacher

Personalia

Family name, First name:	Schwarzacher, Sebastian
Researcher unique identifiers:	ORCID: 0000-0003-2415-1172, Scopus: 51864654900
	Researcher ID: V-8567-2019, MR Author ID: 956465
Date of birth:	24th July 1984
Nationality:	Austria
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Main research areas

Nonlinear partial differential equations (analysis for weak solutions)

Fluid dynamics (compressible and non-Newtonian fluids, fluid-structure interaction)

Calculus of variations (rate independent systems, elastic solids)

Analysis for numerics for PDEs (Galerkin methods, convergence rates)

Analysis of evolutionary non-linear PDEs (variable in time domains, intrinsic geometry)

Professional career and education

Jan. 2017–	Charles University, Prague, Faculty of Mathematics and Physics, Assistant Professor
Jul. 2018	Habilitation for associate professor in Italy.
2017–2018	University of Bonn, Inst of Appl. Math., Scientific Assistant
2014–2016	Charles University, Prague, (Czech Rep.), Faculty of Math. and Phys., Postdoc position
2010–2014	Ludwig Maximilian University Munich, (Germany), Scientific Assistant
Oct. 2013	PhD thesis, (Grade: *summa cum laude*)
2007–2010	University of Freiburg, (Germany), Studies in Mathematics (Diploma, grade 1).
2006–2007	University of Padova, (Italy), Erasmus exchange student
2003–2006	University of Vienna, (Austria), Mathematics, History.
2002–2003	Beauchamp College Oadby, Leicestershire, (U.K.), A-levels.

Grants & Awards

2019–2021	Primus grant PRIMUS/19/SCI/01 (University grant), Primary Investigator. Amount ca. 312 000 EUR, includes two Postdoc positions.
2019–2021	GAČR grant GJ19-11707Y (national), Primary Investigator. Amount ca. 200 000 EUR, shared over seven team members.
Jan. 2018–	UNCE/SCI/023, University centre (MathMAC), scientific member.
Jun. 2017	Visiting grant from the Univ. of Florence for 1 month.
2016–2017	ERC-CZ project MORE, LL1202, scientific member.
Oct. 2014	PhD thesis awarded with the *Carathéodory-Preis* of the LMU Munich
Jun. 2014	Awarded with a *Leopoldina-Postdoc-Stipendium*, (not accepted).
Sep. 2011	Diploma thesis awarded with the *Alumni-Preis* of the University of Freiburg

Accepted publications

27 papers in scientific peer reviewed journals. Including the Arch. Ration. Mech. Anal., Amer. J. Math., J. Math. Pures Appl., Anal. & PDE, Siam J. Math. Anal. (2×), Siam J. Numer. Anal., Annal. l'Inst. Hen. Poinc. (C), Jour. of Funct., Trans. of AMS, Math. Mod. Meth. Appl. Sci. (2×), Calc. Var. & PDE (3×), Numer. Math., J. Diff. Eq. (3×).

Organisation of scientific meetings

Hausdorff School *Modeling and analysis of evolutionary problems in materials science* at the University of Bonn in Sept. 2019 (together with J. Velázquez and M. Bonacini).

Lectures at workshops and conferences

In 10 different countries, where 18 Lectures were invited talks.
Invited speaker to the *Workshop on Analytic-Geometric Inequalities and Related Topics*, (*Institute Mittag Leffler*, Sweden, 2019)
Invited speaker at the *FSDONA 2019*, (Turku, Finland)
Plenary speaker to the *Japanese-Italian conference*, (*Palazzone in Cortona*, Italy 2019)
Plenary speaker to the *GAMM-Workshop on the Analysis of PDE*, (Stuttgart, Germany 2019)
Invited speaker at the workshop *Geometric Measure Theory and Free Boundary Problems*, (Hausdorff Research Institute of Mathematics, Germany, 2019)
Invited speaker to the *Workshop on Nonlinear Parabolic PDEs*, (*Institute Mittag Leffler*, Sweden, 2018).
Invited speaker in a mini-Symposium, (*Joint Meeting of KMS-DMV*, Seoul, Korea, 2018)
Invited speaker at the *Nonlinear Flows: Entropy methods, dissipative systems, and applications*, (*Erwin Schrödinger Inst.*, Austria, 2016)
As PhD student lectures at the *Math. Research Inst. Oberwolfach* (Germany, 2013), *Institute Mittag Leffler* (Sweden, 2013) and the *Banach Center Bedlewo* (Poland, 2012).

Invited seminar talks

in 18 different institutions. Including the *Univ. of Oxford*, *Univ. of Warwick*, *Heriot Watt Univ. Edinburgh*, *Univ. of Bonn*, *TU Munich*, *Univ. of Warsaw*, *National Univ. Seoul*, *Univ. of Florence*, *IST Austria*.

Reviewing activities

Analysis und PDE, Ann. Mat. Pura ed Appl., Bull. Lond. Math. Soc., IMA J. Num. Anal., J. Math. Fluid Mech., Math. Nachrichten, Monatshefte der Mathematik, NoDea, Nonlin. Anal., SIAM J. on Math. Anal.

Teaching activity

Lectures (16), seminars (11) and mentorings (2) for Bachelor and Master students from mathematics and economics. Supervision of three Master Students (C. Mîndrilă 2017/18, K. Kowalczyk and A. Češík 2018/2019). All continue in academia (A. Češík & C. Mîndrilă in Prague and K. Kowalczyk at Univ. Bonn) and all three theses include original research for which publications are in preparation. One co-supervision (T. Scharle, now PhD at Univ. of Oxford).

Supervision of graduate students and postdoctoral fellows

Currently three Postdocs (G. Gravina, M. Kampschulte and G. Sperone) and two PhD students (C. Mîndrilă, A. Češík) are under my supervision. Other members of my group: B. Benešova (senior staff), K. Tuma (senior staff), B. She (Postdoc), J. Scherz (PhD). Previous Postdocs: J. Burczak (now substitute professor in Leipzig), M. Sroczinski (now at Univ. of Konstanz).

1 List of publications

1.1 Scientific journals

27. E. Chiodaroli, O. Kreml, V. Macha, S. Schwarzacher: Non-uniqueness of admissible weak solutions to the compressible Euler equations with smooth initial data, *to appear in Trans. of AMS*, (2019), *Preprint: arXiv:1812.09917.*

26. K. Moring, C. Scheven, S. Schwarzacher, T. Singer: Global higher integrability of weak solutions of porous medium systems, *Comm. Pure & Appl. Anal.*, **19**, (2020), 1697–1745.

25. U. Gianazza and S. Schwarzacher: Self-improving property of the fast diffusion equation, *JFA*, **277**, (2019), 108291.

24. M. Bulicek, S. Byun, P. Kaplicky, J. Oh, S. Schwarzacher: On global L^q estimates for systems with p-growth in rough domains, *Calc. Var. & PDE*, **58**, (2019), 185.

23. V. Macha, S. Schwarzacher: Global continuity and BMO estimates for non-Newtonian fluids with perfect slip boundary conditions, *to appear in Revista Matemática Iberoamericana*, (2019), *Preprint: arXiv:1710.09426.*

22. M. Bulíček, J. Burczak, S. Schwarzacher: Well posedness of nonlinear parabolic systems beyond duality, *Annal. l'Inst. Henri Poincaré / Analyse non linéaire*, **36**, (2019), 1467–1500.

21. L. Diening, T. Scharle, S. Schwarzacher: Regularity for parabolic systems of Uhlenbeck type with Orlicz growth, *Journ. Math. Anal. & Appl.*, **472**, (2019), 46–60.

20. U. Gianazza and S. Schwarzacher, Self-improving property of degenerate parabolic equations of porous medium-type, *Amer. Jour. Math.*, **141**, (2019), 399–446 .

19. Y. Lu and S. Schwarzacher: Homogenization of the compressible Navier-Stokes equations in domains with very tiny holes, *Jour. Diff. Eq.*, **265**, (2018), 1371-1406.

18. D. Breit and S. Schwarzacher, Compressible fluids interacting with a linear-elastic shell, *Arch. Rat. Mech. Anal.,* **228**, (2018), 495–562.

17. A. Cianchi and S. Schwarzacher, Potential estimates for the p-Laplace system with data in divergence form, *Jour. Diff. Eq.*, **265**, (2018), 478–499.

16. D. Breit, A. Cianchi, L. Diening, T. Kuusi and S. Schwarzacher, Pointwise Calderón-Zygmund gradient estimates for the p-Laplace system, *J. Math. Pures Appl.,* **114**, (2018), 146–190

15. F. Rindler, S. Schwarzacher and E. Süli, Regularity and approximation of strong solutions to rate-independent systems, *Math. Models Methods Appl. Sci.*, **27**, (2017), 2511–2556.

14. L. Diening, S. Schwarzacher, B. Stroffolini and A. Verde, Parabolic Lipschitz truncation and Caloric Approximation *Calc. Var. & PDE*, **56**, (2017), 120.

13. D. Breit, A. Cianchi, L. Diening, T. Kuusi and S. Schwarzacher, The p-Laplace system with right-hand side in divergence form: Inner and up to the boundary pointwise estimates, *To Nicola Fusco, on the occasion of his sixtieth birthday, Nonlinear Analysis: Theory, Methods & Applications*, **153**, (2017), 200–212.

12. M. Bulíček, J. Burczak and S. Schwarzacher, A unified theory for some non Newtonian fluids under singular forcing, *Siam J. on Mathematical Analysis*, **48**, (2016), 4241–4267.

11. M. Bulíček and S. Schwarzacher, Existence of very weak solutions to elliptic systems of p-Laplacian type, *Calc. Var. & PDE*, **55**, (2016), 52.

10. M. Bulíček, L. Diening and S. Schwarzacher, Existence, uniqueness and optimal regularity results for very weak solutions to nonlinear elliptic systems *Analysis & PDE*, **9**, (2016), 1115–1151.

9. J. Frehse, S. Schwarzacher, On regularity of the time derivative for degenerate parabolic systems, *Siam J. on Mathematical Analysis*, **47**, (2015), 3917–3943.

8. D. Breit, L. Diening, S. Schwarzacher, Finite element methods for the p(.)-Laplacian, *Siam J. on Numerical Analysis*, **53**, (2015), 551–572.

7. L. Diening, S. Schwarzacher, Global gradient estimates for the p(.)-Laplacian, *Nonlinear Analysis: Theory, Methods & Applications*, **106**, (2014), 70–85.

6. S. Schwarzacher, Hölder-Zygmund estimates for degenerate parabolic systems, *Journal of Differential Equations*, **256**, (2014), 2423–2448.

5. L. Diening, P. Kaplický, and S. Schwarzacher, Campanato estimates for the generalized stokes system, *Annali di Matematica Pura ed Applicata*, **193**, (2014), 1779-1794.

4. D. Breit, L. Diening, and S. Schwarzacher, Solenoidal Lipschitz truncation for parabolic PDEs, *Math. Models Methods Appl. Sci.*, **53**, (2013), 2671–2700.

3. L. Diening and S. Schwarzacher, On the key estimate for variable exponent spaces, *Azerbaijan Journal of Mathematics*, **3**, (2013), 75–82.

2. L. Diening, C. Kreuzer, and S. Schwarzacher, Convex hull property and maximum principle for finite element minimisers of general convex functionals, *Numerische Mathematik*, **124**, (2013), 685–700.

1. L. Diening, P. Kaplický, and S. Schwarzacher, BMO estimates for the p-Laplacian, *Nonlinear Analysis: Theory, Methods & Applications*, **75**, (2012), 637–650.

1.2 Preprints

7. S. Schwarzacher, M. Sroczinski: Weak-strong uniqueness for an elastic plate interacting with the Navier Stokes equation, (2020), Preprint: arXiv:2003.04049.

6. S. Schwarzacher, B. She: On numerical approximations to fluid-structure interactions involving compressible fluids, (2020), Preprint: arXiv:2002.04636.

5. C. Mindrila, S. Schwarzacher: Existence of steady very weak solutions to Navier-Stokes equations with non-Newtonian stress tensors, (2019), *Preprint: arXiv:1911.02055.*

4. O. Saari, S. Schwarzacher: A reverse Hölder inequality for the gradient of solutions to Trudinger's equation, (2019), *Preprint: arXiv:1910.10498* .

3. F. Rindler, S. Schwarzacher, J. L. Velázquez: Two-speed solutions to non-convex rate-independent systems, (2019), *Preprint: arXiv:1907.05035* .

2. B. Muha, S. Schwarzacher: Existence and regularity for weak solutions for a fluid interacting with a non-linear shell in 3D, (2019).

1. D. Breit, A. Cianchi, L. Diening, S. Schwarzacher: Global Schauder estimates for the p-Laplace system, (2019), *Preprint: arXiv:1903.12496* .

1.3 Proceedings

1. S. Schwarzacher, BMO-estimates for the p-Laplacien, *Oberwolfach Report 2013. Miniworkshop: The p-Laplacian Operator and Applications*, **8**, (2013), 442–444.

2 Scientific Lectures

2.1 Lectures at conferences

31. Rate independent solutions with two time-scales, *2019 Leipzig-Prague analysis summer meeting*, Hotel Belveder, Labska Stran, Invited speaker, Czech Republick, 28.6.-1.7.2019

30. The p-Laplace system with right-hand side in divergence form: Inner and up to the boundary Campanato estimates, *RomFin and FSDONA conference*, University of Turku, Invited speaker, Finland, 10.6.–15.6.2019

29. Lipschitz truncation and applications in PDEs, *INdAM Meeting on "Geometric Properties for Parabolic and Elliptic PDE's"*, Palazzone in Cortona, Invited plenary speaker, Italy, 20.5.–24.5.2019.

28. The p-Laplace system with right-hand side in divergence form: Inner and up to the boundary Campanato estimates, *Analytic-Geometric Inequalities and Related Topics*, Institute Mittag Leffler, Invited speaker, Stockholm, Sweden, 13.5.–17.5.2019.

27. Existence and Regularity for a fluid interacting with a non-linear Koiter Shell. *Workshop on Fluid-Structure Interaction*, Invited speaker, Milan, Italy, 18.3.–20.3.2019.

26. Rate independent solutions with two time-scales, *GAMM 2019 Annual Meeting*, Vienna, Austria, 18.2.–22.2.2019.

25. On fluid-structure interactions and compressible fluids, *Workshop: Geometric Measure Theory and Free Boundary Problems*, Invited speaker, Hausdorff Research Institute of Mathematics, Bonn, Germany, 11.2–15.2.2019.

24. On fluid-structure interactions and compressible fluids, *Workshop on ANALYSIS and PDE*, Invited speaker, Leibniz University of Hannover, Germany, 8.10–10.10.2018.

23. The p-Laplace system with right-hand side in divergence form: Inner and up to the boundary Campanato estimates, *Joint Meeting of KMS-DMV*, Invited speaker for a mini-Symposium, Seoul, Korea, 3.10.-6.10.2018.

22. Rate independent solutions with two time-scales *6th GAMM-Workshop on the Analysis of Partial Differential Equations*, Invited plenary speaker, University of Stuttgart, Germany, 19.9.–21.9.2018.

21. Lipschitz truncation and applications in PDEs, *Workshop on Nonlinear Parabolic PDEs*, Institute Mittag Leffler, Invited speaker, Stockholm, Sweden, 11.6.–15.6.2018.

20. On compressible fluids interacting with an elastic shell, *Final conference of the project ERC-CZ MORE – Implicitly constituted materials: Modeling, Analysis and Computing*, Invited speaker, Roztoky, Czech Republic, 31.7.–4.8.2017.

19. Existence of strong solutions to rate independent systems, *Equadiff 2017*, Invited talk at the mini-isymposia PDE analysis for implicitly constituted materials, Bratislava, Slovakia, 24.7–28.7.2017.

18. A Gehring type results for the porous medium equation, *Recent Advances in PDEs*, Invited speaker, Naples, Italy, 12.7.–14.7.2017.

17. On compressible fluids interacting with an elastic shell, *Fluid Mechanics*, Kacov, Czech Republic, 28.5–2.6.2017.

16. Higher integrability for the porous medium equation *Workshop: Nonstandard Growth Analysis and its Applications, The Simons Semester CrossFields PDEs*, Invited speaker, Warsaw, Poland, 14.3.–16.3.2017.

15. Very weak solutions to non-Newtonian fluids, *First Chinese Czech Conference on Mathematical Fluid Mechanics*, Invited speaker, Beijing, China, 26.9.–30.9.2016.

14. Self-improving property of degenerate parabolic equations of porous medium-type, *Partial Differential Equations and Related Topics*, Invited speaker, Alghero, Italy, 12.9.–16.9.2016.

13. Self-improving property of degenerate parabolic equations of porous medium-type, *FSDONA*, Prague, Czech Republic, 4.7.–9.7.2016.

12. On the time derivative of degenerated parabolic PDEs *Nonlinear Flows, workshop: Entropy methods, dissipative systems, and applications,*, Invited speaker, Vienna, Austria, 13.6.–17.6.2016.

11. Self-improving property of degenerate parabolic equations of porous medium-type, *Regularity theory for elliptic and parabolic systems*, Invited speaker, Telč, Czech Republic, 27.4.–30.4.2016.

10. Existence, Uniqueness and Regularity for very weak solutions to non-linear systems *Fluid Mechanics*, Kacov, Czech Republic, 22.5–29.5.2015.

9. Pointwise estimates for energy solutions *Modeling, analysis and computing in nonlinear PDEs.*, Liblice, Czech Republic, 21.9–26.9.2014.

8. Discrete maximum principle for non-linear systems, *12th Finite Element Fair*, Vienna, Austria, 30.5.–31.5.2014.

7. BMO estimates for degenerate parabolic systems *Regularity theory for elliptic and parabolic systems*, Invited speaker, Telč, Czech Republic, 1.5.-3.5.2014.

6. Parabolic Calderon-Zygmund estimates, *Evolutionary Problems*, Institute Mittag Leffler, Stockholm, Sweden, 2.9.–13.12.2013.

5. BMO Estimates for p-Parabolic Systems, *Equadiff 13*, Prag, Czech Republic, 26.8.–30.8.2013.

4. On BMO estimates for the p-Laplacian, *Mini-Workshop: The p-Laplacian Operator and Applications*, Oberwolfach, Germany, 10.2.–16.2.2016.

3. BMO-Estimates for the p-Laplace, *Parabolic and Navier-Stokes equations*, Banach Center, Bedlewo, Poland 2.9.–8.9.2012

2. Discrete maximal principle for non-linear systems, *Analytical and Numerical Aspects of Evolution Equations*, Bielefeld, Germany, 19.3.–23.3.2012.

1. BMO-Estimates for the p-Laplace, *Fluid Mechanics*, Kacov, Czech Republic, 27.5.–3.6.2011.

2.2 Invited seminar talks

26. Analysis for the interaction between fluids and solids., *Colloquium for mathematics*, University of Zagreb, Croatia, 18.2.2020.

25. Global Schauder estimates for the p-Laplace system, *Oberseminar Angewandte Analysis und Numerik*, Goethe Univ. Frankfurt, Germany, 18.12.2019.

24. Existence and regularity for a non-linear Koiter shell interacting with an incompressible fluid , *Oberseminars Dynamics at TU Munich*, Garching, Germany, 17.6.2019.

23. On compressible fluids interacting with an elastic shell, *Analysis Seminar at University of Essen*, Essen, Germany, 24.1.2019.

22. On compressible fluids interacting with an elastic shell, *Seminar ANEDP at ULB*, Brussels, Belgium, 8.1.2019.

21. On compressible fluids interacting with an elastic shell, *MathPhys Analysis Seminar at IST Austria*, Klosterneuburg, Austria, 30.11.2017

20. Existence and discretisation of strong solutions to rate independent systems. *Oberseminar der Arbeitsgemeinschaft Numerische Analysis Dynamischer Systeme,* University of Bielefeld, Germany 23.10.2017

19. On compressible fluids interacting with an elastic shell, *Oberseminar der Arbeitsgemeinschaft Numerische Analysis Dynamischer Systeme,* University of Bielefeld, Germany 15.5.2017

18. Remarks on the regularity of elliptic and parabolic p-Laplacian *Invitation of S. Byun at Seoul National University*, Seoul, Korea 28.2.2017

17. Regularity of strong solutions to rate-independent systems *Seminario di Calcolo delle Variazioni & Equazioni alle Derivate Parziali*, Florence, Italy 9.6.2017.

16. Very weak solutions to non-Newtonian fluids, *Oberseminar Analysis*, Bonn, Germany, 8.12.2016.

15. Very weak solutions to non-Newtonian fluids, *PDE CDT Lunchtime seminar*, Oxford, UK 24.11.2016.

14. Existence and regularity for a class of rate-independent systems. *Oberseminar Analysis*, Regensburg, Germany 10.06.2016.

13. Existence and regularity for a class of rate-independent systems. (Mini Course) *MORE Seminar*, Prague, Czech Republic, 11.4.+18.4.2016.

12. Very weak solutions to nonlinear elliptic systems *Seminario di Calcolo delle Variazioni & Equazioni alle Derivate Parziali* , Florence, Italy, 11.3.2016.

11. Existence, uniqueness and optimal regularity results for very weak solutions to nonlinear elliptic systems *Oberseminar Partielle Differentialgleichungen*, Konstanz, Germany, (2016).

10. Convex hull property for non-linear systems, *Oberseminar Angewandte Analysis*, Osnabrück, Germany, (2016).

9. Existence, uniqueness and optimal regularity results for very weak solutions to nonlinear elliptic systems *MORE Seminar*, Prague, Czech Republic, (2015).

8. Existence, Uniqueness and Regularity for very weak solutions to non-linear systems *University of Warsaw*, Warsaw, Poland, (2015).

7. Existence, uniqueness and optimal regularity results for very weak solutions to nonlinear elliptic systems *Analysis Seminar of Heriot Watt Univ.*, Edinburgh, UK (2015).

6. On the time derivative of degenerated parabolic PDEs *Analysis Seminar of Warwick Univ.*, Coventry, UK (2015).

5. On the time derivative of degenerated parabolic PDEs *Seminar on Partial differential equations*, Prague, Czech Republic, (2014).

4. Pointwise gradient bounds for nonlinear elliptic systems PDEs *Analysis Seminar of Heriot Watt Univ.*, Edinburgh, UK, (2014).

3. Solenoidal Lipschitz truncation and its application to existence theory for fluids *Nečas seminar on continuum mechanics*, Prague, Czech Republic, (2014).

2. Regularity for Degenerate Elliptic and Parabolic Systems *Promotionsvortrag*, LMU München, Germany, (2013).

1. BMO estimates of the p-Laplacian and p-fluids, *Seminar talk*, Seconda Università degli Studi di Napoli, Caserta, Italy, (2012).