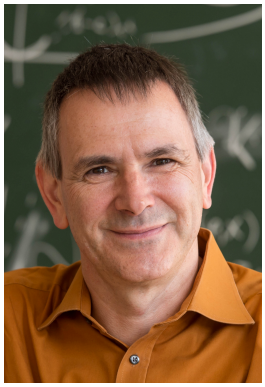
Stefan Müller



Academic career

1987	Diploma in Mathematics, University of Bonn
1989	PhD, Heriot-Watt University, Edinburgh, Scotland, UK
1989 - 1990	Visiting Assistant Professor, Carnegie Mellon University, Pittsburgh, PA, USA
1990 - 1993	Postdoc, DFG Collaborative Research Center SFB 256 “Nichtlineare partielle Differentialgleichungen”, University of Bonn
1993 - 1994	Visiting Member, Institute of Advanced Study, Princeton, NJ, USA
1994	Professor, University of Freiburg
1995	Professor, ETH Zürich, Switzerland
1996 - 2008	Director, Max Planck Institute for Mathematics in the Sciences, Leipzig
Since 2008	Professor (C4), University of Bonn
Since 2010	External Scientific Member, Max Planck Institute for Mathematics, Bonn

Honours

1992	Prize of the European Mathematical Society
1993	Max Planck Research Award (jointly with V. Sverák)
1999	Member of the Berlin-Brandenburg Academy of Sciences and Humanities
1999	Collatz Prize of ICIAM
2000	Leibniz Prize
2002	Member of the Leopoldina (German National Academy of Sciences)
2013	Heinz Gumin Prize for Mathematics of the Carl Friedrich von Siemens Foundation
2014	Member of the North Rhine-Westphalian Academy of Sciences, Humanities and the Arts
2015	Member of the Academia Europaea
2017	Teaching Award University of Bonn
2018	Member of the European Academy of Sciences

Invited Lectures

1994	Plenary speaker, German Mathematical Society, Duisburg
1996	European Congress of Mathematics, Budapest, Hungary
1997	Austrian Mathematical Society
1997	Andrejewski Lectures, Berlin
1998	International Congress of Mathematicians, Berlin
1998	Annual Meeting of GAMM, Bremen
1999	ICIAM, Edinburgh, Scotland, UK
2000	Ordway Lectures, Minneapolis, MN, USA
2003	Landau Lectures, Jerusalem, Israel
2006	Gauss Lecture, Bremen
2006	ICMP, Rio de Janeiro, Brasil
2009	Annual Meeting of Leopoldina (German National Academy of Sciences)
2010	Conference “New developments in elasticity: the legacy of Robert Hocke”, Oxford, England, UK
2013	Lecture series “Mathematical problems in thin elastic sheets”, Cetraro, Italy
2015	Conference “Geometric nonlinear analysis”, ETH Zürich, Switzerland

Research Projects and Activities

Coordinator of the DFG Collaborative Research Center SFB 1060 “The Mathematics of Emergent Effects”
Principal Investigator of the DFG Cluster of Excellence “Hausdorff Center for Mathematics”

Research profile

My goal is to develop mathematical methods to describe and understand multiscale problems and the formation, evolution and macroscopic effects of microstructure, in particular in advanced materials. I have always been fascinated by the subtle interplay of geometry, analysis, and physics in nonlinear elasticity, both for conventional and for phase-transforming materials. Results include a qualitatively new homogenization formula in nonlinear elastic materials, the first rigorous understanding of dimension reduction in nonlinear elasticity [**?**, **?**], and rigorous scaling laws for branching near austenite / martensite interfaces [**?**]. Implications for material design, e.g., for low-hysteresis shape memory alloys are explored in [**?**]. In turn estimates and constructions first discovered in elasticity led to new results in geometry and rather striking counterexamples to Hilbert’s 19th problem in PDE [**?**].
Recent and ongoing work addresses the influence of microscopic defects on effective material behaviour, e.g. in plasticity [**?**, **?**] as well as scaling levels and pattern formation in thin elastic sheets [**?**]. In both areas the rigidity estimates of [**?**] play a crucial role. I have also begun to work on the relation between atomistic and continuum theory of solids through statistical mechanics and rigorous renormalization.

Editorships

- Archive of Rational Mechanics and Analysis
- Control, Optimisation and Calculus of Variations
- Forum of Mathematics, Pi and Sigma

Research Area B Expertise in nonconvex problems in the calculus of variations and their applications to material microstructure, including recent extensions to atomistic models as well as in a broad range of rigorous multiscale methods, including homogenization, singular perturbations [**?**], and Γ-convergence [**?**, **?**, **?**].

Research Area G Statistical mechanics of solids and thermodynamic limits through rigorous renormalization group methods.
Relations between variational methods and small noise limits through capacity estimates and the theory of large deviations.

Supervised theses

PhD theses: 20, currently 4

Selected PhD students

Anja Schlömerkemper (2002): “Magnetic Forces in Discrete and Continuous Systems”,
now Professor, University of Würzburg
Christof Melcher (2002): “Néel walls and regularity in thin film micromagnetics”,
now Professor, RWTH Aachen
László Székelyhidi Jr. (2004): “Elliptic Regularity versus Rank-One Convexity”,
now Professor, University of Leipzig
Bernd Schmidt (2006): “Effective theories for thin elastic films”,
now Professor, University of Augsburg
Barbara Zwicknagl (2011): “Mathematical analysis of microstructures and low hysteresis shape memory alloys”,
now Junior Professor, University of Würzburg

Habilitations

Bernd Kirchheim (2001), now Professor, University of Leipzig
Georg Dolzmann (2002), now Professor, University of Regensburg
Sergio Conti (2004), now Professor, University of Bonn