



Prof. Dr. Patrizio Neff

Curriculum Vitae

Personal data

Born 17th September, 1968 in Mosbach/Baden, Germany
Current position Full Professor (W3)
Contact University of Duisburg-Essen
Faculty of Mathematics
Thea-Leymann-Str. 9
45127 Essen
Phone +49 201 183 4243
Fax +49 201 183 4394
Email patrizio.neff@uni-due.de
Website www.uni-due.de/mathematik/ag_neff/

Education

1975–1979 **Basic primary school**, *Pestalozzi-Schule*, Groß-Umstadt
1979–1981 **Primary school**, *Geiersbergschule*, Groß-Umstadt
1981–1985 **Secondary modern school**, *Ernst-Reuter-Schule*, Groß-Umstadt, *O-level*
1985–1988 **Grammar school**, *Alfred-Delp-Schule*, Dieburg, *university entrance diploma*
1988–1989 **Military Service**, *Panzer Grenadierbataillon 53*, Fritzlar, Hessen
1989–1992 **Undergraduate studies**, *TH Darmstadt*, Darmstadt
Intermediate Diploma Mathematics and Examination in History (for teaching)
1992–1995 **Graduate studies**, *TH Darmstadt*, Darmstadt
1992–1993 **Study abroad**, *University of Sussex*, Brighton GB
Erasmus Stipendium, Lectures with Prof. Edmunds, Prof. Elliott
since 1994 **Collaborator in the working group 6, Prof. H.-D. Alber**, *TH Darmstadt*, Darmstadt
"Partial Differential Equations and Applications"
Nov. 1995 **Diploma in Mathematics**, *TH Darmstadt*, Darmstadt, "*Summa cum laude*"
Subjects I + II: Functional Analysis + Philosophy
1996–1997 **Ph.D. studies**, *TU Darmstadt*, Darmstadt
Hessian State grant

Feb. 2000 **Ph.D.**, *TU Darmstadt*, Darmstadt, "*Summa cum laude*"
 8th July, 2004 **Habilitation**, *TU Darmstadt*, Darmstadt

Theses

Nov. 1995 Diploma thesis
 Title "*A stationary vortex ring as weak solution of the Euler equations*"
 Supervisor Prof. H.-D. Alber

Feb. 2000 Ph.D. thesis
 Title "*Mathematical Analysis of Multiplicative Viscoplasticity*"
 Referees Prof. H.-D. Alber, Prof. E. Meister

Jul. 2004 Habilitation thesis
 Title "*Geometrically exact Cosserat theory for bulk behaviour and thin structures. Modelling and mathematical analysis*"
 Referees Profs. H.-D. Alber, M. Hieber, K. Hutter, S. Müller, P. Steinmann

Professional experience

1997–1998 **Collaborator in interdisciplinary Collaborative Research Center SFB 298**, *TU Darmstadt*, Darmstadt
 "Deformation and Failure" under direction of Prof. Kollmann.

1998–2000 **Lecturer Department of Mathematics**, *TU Darmstadt*, Darmstadt

2000–2001 **Senior Lecturer Department of Mathematics**, *TU Darmstadt*

2001–2002 **Visiting Associate Professor**, *California Institute of Technology*, Pasadena, USA, Aeronautics, Prof. Ortiz

2002–2004 **Senior Lecturer Department of Mathematics**, *TU Darmstadt*

since July 2004 **Assistant Professor Department of Mathematics**, *TU Darmstadt*

Oct. 2005 **Substitute of Full Professor W3 of Nonlinear Analysis**, *University of Duisburg-Essen*

2006–2009 **Senior Lecturer Department of Mathematics**, *TU Darmstadt*

since 2009 **Full Professor W3 and Chair of Nonlinear Analysis**, *University of Duisburg-Essen*, Essen

2010–2012 **Dean of Studies**, *Faculty of Mathematics*, *University of Duisburg-Essen*

2011–2015 **Initiator and speaker of the Mathematics Preliminary Course Program**, *University of Duisburg-Essen*, supported by the *Bund-Länder-Programm*

since 2012 **Member of faculty board**, *Faculty of Mathematics*, *University of Duisburg-Essen*

2014–2015 **Collaborator on the creation of the OMB+ E-Learning Platform**, *Cooperation of 11 German universities*

spring 2016 **Visiting Professor**, *INSA*, Lyon

spring 2017 **Visiting Professor**, *INSA*, Lyon

Teaching experience

2003	Introduction to Variational Methods (english)
2005	Elementare Partielle Differentialgleichungen
2005–2006	Mathematische Modellierung und Differentialgleichungen
2006–2007	Mathematik I für Biologen und Chemiker
2007	Mathematik II für Chemiker und Biologen
2007	Elementare Partielle Differentialgleichungen, <i>Darmstadt</i>
2007–2008	Mathematik I für Biologen und Chemiker
2008	Mathematik II für Chemiker und Biologen
2008–2009	Analysis I für Mathematiker (english)
2009	Funktionalanalysis 1
2009–2010	Analysis 1 für Mathematiker
2010	Analysis 2 für Mathematiker
2010–2011	Analysis 3 für Mathematiker
2011	Funktionalanalysis 1
2011–2012	Analysis 1 für Mathematiker
2012	Analysis 2 für Mathematiker
2012–2013	Analysis 3 für Mathematiker
2013	Variationsrechnung und Sobolevräume
2013–2014	Analysis 1 für Mathematiker
2014	Analysis 2 für Mathematiker
2014–2015	Analysis 3 für Mathematiker
2015	Variationsrechnung und Sobolevräume
2015–2016	Nichtlineare Elastizitätstheorie
2016	Gewöhnliche Differentialgleichungen
2016–2017	Charakteristikentheorie und PDE
2018	Variationsrechnung und Sobolevräume
2018–2019	Nichtlineare Elastizitätstheorie
2019	Gewöhnliche Differentialgleichungen
2019–2021	Analysis 1 für Mathematiker
2021	Analysis 2 für Mathematiker
2021–2022	Analysis 3 für Mathematiker
2022	Gewöhnliche Differentialgleichungen
2022–2023	Partielle Differentialgleichungen
2023	Variationsrechnung und Sobolevräume
2023–2026	Nichtlineare Elastizitätslehre
2024–2026	Das Buch der Beweise

Conferences and workshops

More than 150 talks and presentations, including the following:

- October 2001 **Seminar**, *Joint Mathematics and Mechanics Colloquium*, California Institute of Technology, Pasadena
- May 2002 **Plenary lecture**, *Joint Mathematics and Mechanics Colloquium*, University of California, Berkeley
- April 2004 **Seminar**, *Oberseminar Analysis*, Max-Planck Institut für Mathematik in den Wissenschaften
- January 2005 **Plenary lecture**, *GAMM Seminar on Microstructures*, TU Darmstadt
- November 2005 **Miniworkshop**, *Analysis and Computation of Microstructure in Finite Plasticity*, MFO, Oberwolfach
- October 2006 **Seminar**, *COMMAS Summer School on "Computational Mechanics of Materials and Structures"*, Universität Stuttgart
- December 2006 **Plenary lecture**, *Institute of Fundamental Technological Research*, Polish Academy of Sciences, Warsaw
- April 2007 **Seminar**, *Instituts-Kolloquium*, Max-Planck Institut für Eisenforschung
- September 2007 **Plenary lecture**, *Langenbach-Seminar*, Weierstraß Institut für Angewandte Analysis und Stochastik, Berlin
- September 2007 **Plenary lecture**, *Advanced school on "Poly, quasi and rank one convexity in applied mechanics"*, Centre International des Sciences Mecanique (CISM), Udine
- November 2007 **Seminar**, *Colloquium on Applied Analysis*, Universite Pierre et Marie Curie, Paris
- January 2008 **Plenary lecture**, *IUTAM Symposium on Theoretical, Modelling and Computational Aspects of Inelastic Media*, Capetown
- February 2008 **Seminar**, *Applied Mathematics Seminar*, Mathematical Institute, University of Oxford
- May 2008 **Seminar**, *SISSA: International School for Advanced Science*, Trieste, Italy
- May 2009 **Plenary lecture**, *Euromech-Conference 510: Mechanics of generalized continua*, Sorbonne, U-Paris 6, Paris
- October 2009 **Plenary lecture**, *9th conference "Shell-Structures: Theory and Applications"*, Gdansk-Jurata
- November 2012 **Plenary lecture**, *Kolloquium des Fachbereiches Mathematik*, TU Darmstadt
- July 2013 **Plenary lecture**, *Canadian Conference of Nonlinear Solid Mechanics*, McGill-University, Montreal
- July 2013 **Invited**, *ASME-Annual Summer Meeting: SES Medal Symposium in honor of D.J. Steigmann*, Brown University, Providence
- March 2014 **Plenary lecture**, *Euromech on Generalized Continua*, Cisterna di Latina
- February 2015 **Plenary lecture**, *International Symposium on Modern Mathematics and Mechanics*, Olomouc
- July 2015 **Invited**, *European Solid Mechanics Congress*, Madrid
- October 2015 **Keynote**, *International Conference on Extended Continuum Models*, Antalya
- November 2015 **Miniworkshop**, *Plasticity on Different Scales*, MFO, Oberwolfach
- June 2016 **Plenary lecture**, *ETAMM Conference - Emerging Trends in Applied Mathematics and Mechanics*, Perpignan

- July 2016 **Plenary lecture**, *Conference in Honour of G. Grioli*, Accademia Nazionale del Lincei, Rome
- March 2017 **Invited**, *Minisymposium on dislocation-based plasticity*, GAMM annual meeting, Weimar
- June 2017 **Keynote**, *International Symposium on Defects and Material Mechanics*, Lyon
- February 2018 **Workshop**, *Variational Methods for the Modeling of Inelastic Solids*, MFO, Oberwolfach
- April 2018 **Workshop**, *Nonlinear Data: Theory and Algorithms*, MFO, Oberwolfach
- June 2018 **Plenary lecture**, *ETAMM Conference - Emerging Trends in Applied Mathematics and Mechanics*, Krakow
- September 2018 **Keynote**, *Mathematics of Thin Structures*, Dresden
- October 2018 **Workshop**, *Computational Engineering*, MFO, Oberwolfach
- December 2022 **Lecture**, *GAMM Nachwuchsgruppe*, Ruhr-Universität Bochum
- March 2023 **Lecture**, *Ph.D.-Seminar*, Università di Roma
- October 2024 **Lecture**, *Ph: D.-Seminar*, Università di Trento
- February 2025 **Lecture**, RWTH Aachen
- November 2025 **Lecture**, *GAMM Seminar on Microstructures*, TU Dortmund
- February 2026 **Lecture**, *Hausdorff Center for Mathematics*, Bonn
- March 2026 **Lecture**, *Hausdorff Center for Mathematics*, Bonn

Supervised Ph.D. theses

- 2006 **Daniel Balzani**, *Polyconvex anisotropic energies and modelling of damage applied to arterial walls*
W3-Professor for Computational Engineering, Ruhr Universität Bochum
- 2007 **Ingo Münch**, *Ein geometrisch und materiell nichtlineares Cosserat-Modell. Theorie, Numerik und Anwendungsmöglichkeiten*
W3 Professor Statistics and Dynamics, TU Dortmund
- 2008 **Joelle Beyrouthy**, *Reduction dimensionnelle d'un modele viscoelastique en grandes deformations*
- 2009 **Wolfgang Müller**, *Newton-type algorithms on $SO(3)$ and elasto-plastic Cosserat models*
- 2010 **Stefanie Vanis**, *Numerical simulation of finite micromorphic elasticity using FETI-DP domain decomposition methods*
W2-Professor at the Faculty of Automotive Engineering, Ostfalia University of Applied Science Wolfsburg
- 2010 **Vera Vetrov née Ebbing**, *Design of polyconvex energy functions for all anisotropy classes*
Full Professor, Institute of Engineering and Natural Science, Westfälische Hochschule, Gelsenkirchen
- 2016 **Robert Martin**, *Logarithmic strain and its role in nonlinear elasticity*
Assistant Professor at the Faculty of Engineering, University of Duisburg-Essen
- 2016 **Christian Thiel**, *Neue Matrix-Ungleichungen und Anwendungen auf konstitutive Beziehungen in der nichtlinearen Elastizitätstheorie*

- 2019 **Robert Martin**, *Generalized convexity of functions and relaxation in nonlinear elasticity theory*, Habilitation Thesis
- 2021 **Jendrik Voss**, *Constitutive inequalities in nonlinear elasticity and quasiconvexity*, Postdoc, TU Dortmund
- 2022 **Hassam Khan**, *Rayleigh waves in generalized continua (DAAD grant)*, Assistant Professor, Karachi, Pakistan
- 2022 **Adam Sky**, *Higher order finite elements for relaxed micromorphic continua*, Associate Professor, University of Eastern Finland
- 2022 **Maryam Mohammadi Saem**, *Higher order finite elements for relaxed micromorphic continua*, Postdoc, University Witten-Herdecke
- 2024 **Mohammad Sarhil**, *On the finite element realization, boundary conditions and parameters identification of the relaxed micromorphic model*, Postdoc, TU Dortmund

Publications

More than 207 refereed articles with > 3164 citations by > 1286 authors in [MathSciNet](#), h-index (excluding self-citations): 40, see also

- [zbMath](#)
- [Web of Science](#)
- [arXiv](#)
- [google scholar](#) (> 10620 citations)
- [Research Gate](#) (> 11397 citations)

Selected publications

- [1] Ionel-Dumitrel Ghiba, Robert J Martin, and Patrizio Neff. "Rank-one convexity implies polyconvexity in isotropic planar incompressible elasticity". In: *Journal de Mathématiques Pures et Appliquées* 116 (2018), pp. 88–104.
- [2] Sebastian Bauer et al. "Dev-Div- and DevSym-DevCurl-inequalities for incompatible square tensor fields with mixed boundary conditions". In: *ESAIM: Control, Optimisation and Calculus of Variations* 22.1 (2016), pp. 112–133.
- [3] Angela Madeo et al. "Reflection and transmission of elastic waves at interfaces embedded in non-local band-gap metamaterials: a comprehensive study via the relaxed micromorphic model". In: *Journal of the Mechanics and Physics of Solids* 95 (2016), pp. 441–479.
- [4] Patrizio Neff, Bernhard Eidel, and Robert J. Martin. "Geometry of logarithmic strain measures in solid mechanics". In: *Archive for Rational Mechanics and Analysis* 222.2 (2016). 1505.02203, pp. 507–572. DOI: 10.1007/s00205-016-1007-x.
- [5] Patrizio Neff, Dirk Pauly, and Karl-Josef Witsch. "Poincaré meets Korn via Maxwell: Extending Korn's first inequality to incompatible tensor fields". In: *Journal of Differential Equations* 258.4 (2015), pp. 1267–1302.
- [6] Patrizio Neff, Yuji Nakatsukasa, and Andreas Fischle. "A logarithmic minimization property of the unitary polar factor in the spectral and Frobenius norms". In: *SIAM Journal on Matrix Analysis and Applications* 35.3 (2014), pp. 1132–1154. DOI: 10.1137/130909949.
- [7] Sergiy Nesenenko and Patrizio Neff. "Well-posedness for dislocation based gradient viscoplasticity I: Subdifferential case". In: *SIAM Journal on Mathematical Analysis* 44.3 (2012), pp. 1694–1712.

- [8] Jörg Schröder, Patrizio Neff, and Vera Ebbing. "Anisotropic polyconvex energies on the basis of crystallographic motivated structural tensors". In: *Journal of the Mechanics and Physics of Solids* 56.12 (2008), pp. 3486–3506. DOI: 10.1016/j.jmps.2008.08.008.
- [9] Jörg Schröder and Patrizio Neff. "Invariant formulation of hyperelastic transverse isotropy based on polyconvex free energy functions". In: *International Journal of Solids and Structures* 40.2 (2003), pp. 401–445. DOI: 10.1016/S0020-7683(02)00458-4.
- [10] Patrizio Neff. "On Korn's first inequality with non-constant coefficients". In: *Proceedings of the Royal Society of Edinburgh Section A: Mathematics* 132.01 (2002), pp. 221–243.

Grants and Funding

"Konstruktion und Analyse anisotroper polykonvexer Energiefunktionen"

DFG Research Project **NE 902/2-1** and **SCHR 570/6-1**, with J. Schröder

First funding period: 2006–2008, Second funding period: 2009–2011

Funding received: ~ 315.000 €

MINT-Vorkurs

Part of the *Bund-Länder-Programm*

One professorship (W2) and two assistant positions (TVL-E13)

Funding received: ~ 900.000 €

"Modelling and mathematical analysis of geometrically nonlinear elasto-plastic Cosserat shells with higher order effects"

DFG research project **NE 902/8-1** and **BI 1965/2-1**, with M. Birsan

Funding period: 2019–2023

Funding: ~ 175.000 €

Approved

"A variational scale-dependent transition scheme - from Cauchy elasticity to the relaxed micromorphic continuum"

DFG research project **NE 902/10-1** and with L. Scheunemann and J. Schröder.

Funding period: 2021–2024

Funding: ~ 11.000 €

Approved

"A variational scale-dependent transition scheme - from Cauchy elasticity to the relaxed micromorphic continuum"

DFG research project **NE 902/10-2** and with L. Scheunemann and J. Schröder.

Funding period: 2023–2026

Funding: ~ 24.000 €

Approved

Member of Editorial Board

- Archive of Mechanics, Springer
- Zeitschrift für Angewandte Mathematik und Physik, Springer
- Mathematics and Mechanics of Solids, Sage
- Mathematics and Mechanics of Complex Systems, msp
- Journal of Elasticity, Springer
- Continuum Mechanics and Thermodynamics, Springer

- GAMM-Mitteilungen, Wiley
- Archive of Applied Mechanics, Springer

Main research interests

Nonlinear partial differential equations, generalized Korn's inequalities, nonlinear elasticity theory, theory of shells, plates and membranes, elastoplasticity theory, extended continuum mechanics (Cosserat, micropolar, micromorph), homogenisation and Γ -convergence, matrix analysis