

CURRICULUM VITAE

PERSONAL INFORMATION

NAME:	Bosse	CITIZENSHIP:	german
SURNAME:	Torsten Falko	DATE OF BIRTH:	11.11.1981
TITLE:	Dr. rer. nat.	PLACE OF BIRTH:	Sindelfingen

CONTACT INFORMATION

POSTAL ADDRESS:	PHONE:	+49 179 4565612
Torsten Bosse	EMAIL:	torsten.bosse@
Sickingenstraße 10		uni-jena.de
07743 Jena, Germany		

RESEARCH INTERESTS

Algorithmic differentiation, data science, graph theory, HPC, machine learning, non-linear and non-smooth optimization, numerical algorithms and software, piecewise linear algebra

CURRENT AND PREVIOUS POSITIONS

since 01/2017	Post-doctoral researcher at the chair for Advanced Computing, Friedrich-Schiller-University Jena, Germany Supervisor: Prof. Dr. M. Bücker
09/2014-09/2016	Post-doctoral Wilkinson Fellow in the MCS Division, Argonne National Laboratory, Illinois, US Supervisor: Sven Leyffer Ph.D.
02/2010-08/2014	Research associate at the chair for Non-linear Optimization, Humboldt-University of Berlin, Germany Supervisor: Prof. A. Griewank Ph.D.
09/2008-12/2009	Student assistant at the chair for Non-linear Optimization, Humboldt-University of Berlin, Germany Supervisor: Prof. A. Griewank Ph.D.

HONORS AND AWARDS

09/2014	Wilkinson Post-doc Fellow at Argonne National Laboratory, US
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RESEARCH PROJECTS

- 07/2019-12/2019 Member of the project *INF*, DFG Collaborative Research Centre *SFB TRR 166 ReceptorLight*
- 02/2010-10/2012 Member of the project *Automated Extension of Fixed Point PDE Solvers for Optimal Design with Bounded Retardation*, DFG Priority Program *SPP 1253 Optimization with Partial Differential Equations*
- 09/2008-12/2009 Member of the project *C12 General Purpose, Linearly Invariant Algorithm for Large-Scale Non-linear Programming*, DFG Program *MATHEON*

FUNDING PROPOSALS

- 2021 *Interactive Inference - Scientific Breakthroughs in AI*, Carl Zeiss Foundation, **4.823.000 Euro**, joined proposal with O. Beyersdorff, A. Breuer, M. Bücke, J. Giesen, M. Habeck, C. zu Höner zu Siederdiessen, S. Laue, K. Lawonn, M. Meuschke, M. Mundhenk, and R. Seidler - *funded*
- 2021 *THInKI - Thüringer Hochschulinitiative für KI im Studium*, TMWWDG, **1.840.000 Euro**, joined proposal with A. Breuer, M. Bücke, and G. Zumbusch besides various other researchers from FSU Jena and TU Ilmenau - *funded*
- 2018 *DAWI - Zusammenführung von Datenmanagement und -analyse in datengetriebenen Wissenschaften*, Thüringer Aufbaubank, **400.000 Euro**, joined proposal with M. Bücke, J. Denzler, Y. Garcia, F. Klan, B. König-Ries, and H. Ziegler - *funded*

EDUCATION

- 08/2014 Degree: Dr. rer. nat., Humboldt-University of Berlin
Grade: magna cum laude
Title of the thesis: *From Black-Box to Gray-Box Solver*
Supervisor: Prof. A. Griewank Ph.D.
- 01/2010-08/2014 Ph.D. studies at Humboldt-University of Berlin, Berlin
- 12/2009 Degree: Dipl. Math., Humboldt-University of Berlin
Grade: very good
Title of the thesis: *A derivative-matrix-free NLP solver without explicit null-space representation*
Supervisor: Prof. A. Griewank Ph.D.
- 10/2002-12/2009 Diploma studies of Mathematics with minor subject Computer Science at Humboldt-University of Berlin, Berlin
- 08/2001-08/2002 Civil Service, Malteser - Stuttgart, Germany
- 06/2001 General higher education entrance qualification, Königin-Charlotte-Gymnasium, Stuttgart, Germany

INVITED PRESENTATIONS

- 10/2021 24th Euro AD Workshop - virtual - *Tribute to A. Griewank.*
- 02/2019 TU Hamburg - Hamburg, Germany - *A small walk with Taylor... in the rocky mountains.*
- 04/2016 Friedrich-Schiller-University - Jena, Germany - *Piecewise Linear Differentiation in Data Analysis and Machine Learning*
- 04/2016 Technische Universität Darmstadt - Darmstadt, Germany - *An asynchronous One-shot method for HPC*
- 03/2016 INRIA Sophia Antipolis - Nice, France - *One-shot method for design optimization methods*
- 03/2016 USI Università della Svizzera italiana - Lugano, Switzerland - *Piecewise Linear Differentiation and Algebra*
- 12/2015 Technische Universität Kaiserslautern - Kaiserslautern, Germany - *An asynchronous Oneshot method with load-balancing*
- 01/2014 Argonne National Laboratory - Argonne, US - *Algorithms and Software for Simulation Based Optimization*
- 02/2011 ANLO 11 - Heidelberg, Germany - *Non-linear programming with total quasi-Newton methods*

ORGANIZED WORKSHOPS AND MINI SYMPOSIUM

- 11/2018 21ST EURO AD WORKSHOP 2018 - Jena, Germany - Responsible for the organization and execution of the workshop
- 07/2018 23RD ISMP 2018 - Bordeaux, France - Organization of two sessions with 7 talks, Title of the sessions: *Numerically Efficient Methods for Piecewise Algorithmic Differentiation I/II*

PRESENTATIONS ON CONFERENCES AND WORKSHOPS

- 08/2021 SIAM ACDA 2021 - Online - *Efficient signed backward substitution for piecewise affine functions via path problems in DAGs*
- 08/2020 EURO AD 2020 - Online - *How I tortured Pytorch and how Pytorch tortured me...*
- 07/2019 EURO AD 2020 - London, GB - *Localization of ANFs*
- 07/2016 SIAM ANNUAL MEETING 2016 - Boston, USA - *A generalized abs-normal form*

- 04/2016 EURO AD 2016 - Kaiserslautern, Germany - *A Blurred One-Shot Method for Design Optimization*
- 08/2015 3rd ANL WORKSHOP ON AUTOMATIC DIFFERENTIATION - Argonne, US - *A multi-grid method for non-smooth problems*
- 02/2014 Workshop at the Humboldt-University of Berlin - Berlin, Germany - *Piecewise Linearization, Introduction and Perspective*
- 03/2014 SIAM CSE 2014 - Salt Lake City, US - *Augmenting the One-Shot Framework by Additional Constraint*
- 12/2013 EURO AD 2013 - Oxford, England - *(Un-)constrained optimization of PL functions*
- 03/2013 GAMM 2013 - Novi Sad, Serbia - *Adaptive sequencing of primal, dual, and design steps in simulation-driven design optimization*
- 02/2013 DFG SPP 1253 Annual Meeting 2013 - Banz, Germany - *Automated extension of fixed point PDE solvers for optimal design*
- 09/2012 3rd IMA Conference on Numerical Linear Algebra and Optimization - Birmingham, England - *Cubic overestimation and secant updating for unconstrained optimization of $C^{2,1}$ functions*
- 08/2012 21st ISMP 2012 - Berlin, Germany - *Limited memory updating and quadratic overestimation for NLOP*
- 07/2012 AD 2012 - Fort Collins, CO, US - *The Relative Cost of Function and Derivative Evaluations in the CUTeR Test Set*
- 09/2011 DFG SPP 1253 Annual Meeting 2011 - Freising, Germany - *Automated extension of fixed point PDE solvers for optimal design with bounded retardation*
- 07/2011 ICIAM 2011 - Vancouver, Canada - *On Very Limited Memory Total Quasi-Newton Methods*
- 05/2011 SIAM OPT 2011 - Darmstadt, Germany - *On an Iterative Range Space Method*
- 09/2010 DFG SPP 1253 Annual Meeting 2010 - Freising, Germany - *Automated extension of fixed point PDE solvers for optimal design*
- 06/2010 ALIO Informs 2010 - Buenos Aires, Argentina - *LRAMBO - Efficient NLP Solving*
- 09/2009 BFG 2009 - Leuven, Belgium - *A Hessian- and Jacobian-evaluation-free SQP method*
- 08/2009 20th ISMP 2009 - Chicago, US - *An SQP Method Without Hessian or Jacobian Evaluations*

ATTENDED CONFERENCES AND WORKSHOPS

04/2021	FSU ZERTIFIKATSPROGRAMM BASIC - GRUNDLAGEN DER HOCHSCHULDIDAKTIK - Jena, Germany
04/2021	ZWEI BIS DREI BETEILIGEN SICH, DER REST SCHWEIGT. ANSÄTZE FÜR EINE AUSGEWOGENE BETEILIGUNG IN LEHRVERANSTALTUNGEN - Jena, Germany
03/2021	DIGITALE ERKLÄRVIDEOS ERSTELLEN - Jena, Germany
02/2021	CRASH COURSE TESTING AND ASSESSING - Jena, Germany
06/2019	SFB RECEPTORLIGHT SYMPOSIUM - Jena, Germany
06/2019	SFB RECEPTORLIGHT MEETING - Würzburg, Germany
06/2018	BETREUUNG VON PROMOTIONEN - WIE WERDE ICH EIN GUTER BETREUER - Jena, Germany
06/2017	BACI WORKSHOP ON ENVIRONMENTAL INFORMATIC CHALLENGES - Jena, Germany
05/2017	FSU WORKSHOP - DRITTMITTEL BEANTRAGEN FÜR ANFÄNGER - Jena, Germany
02/2017	PROFILING BIG DATA - SMALL PRIVACY ZUM NIEDERGANG DER PRIVATSPHÄRE - Erfurt, Germany
06/2016	D-WAVE QUANTUM PROGRAMMING - Los Alamos, US
05/2016	IBM QUANTUM EXPERIENCE - Argonne, US
06/2015	ACNW Workshop 2015 - Chicago, US
08/2014	6th International Conference on Complementarity Problems - Berlin, Germany
08/2013	Mathematics in Computational Engineering Science Retreat, RWTH Aachen - Hirschegg, Austria
02/2012	1 st Workshop on Algorithmic Challenges in Real-time System - Berlin, Germany
12/2011	12 th European Workshop on Automatic Differentiation 2011 - Berlin, Germany
04/2010	OMS Workshop, Special Issue 2010 - Nice, France
11/2009	4th ERCOFTAC Introductory course to design optimization - Berlin, Germany
10/2008	Workshop of the research training group 1128: <i>Analysis, Numerics, and Optimization of Multiphase Problems</i> , Humboldt-University of Berlin - Budapest, Hungary

PUBLIC RELATIONS AND OUTREACH

- 08/2018 11.jun.iversity-SummerCamp 2018 - Jena, Germany - *Entwicklung einer KI für Tic-Tac-Toe*, Supervisor
- 04/2018 Kinderuniversität Jena - Jena, Germany - *An die Töpfe, fertig, los - Computer in der Küche* with D. Walther and Prof. Dr. H. M. Bücker
- 11/2017 Lange Nacht der Wissenschaften 2017 - Jena, Germany - Information booth *Graph Coloring* with A. Rostami and Prof. Dr. H. M. Bücker
- 11/2017 Lange Nacht der Wissenschaften 2017 - Jena, Germany - *Daten, Wissenschaften, Computer? Das MSCJ als Querschnittszentrum an der FSU Jena* with Prof. Dr. H. M. Bücker

REFEREED ARTICLES IN JOURNALS

- [1] Torsten Bosse. (Almost) matrix-free solver for piecewise linear functions in Abs-normal form). *Numerical Linear Algebra with Applications*, 2019. Online available: <https://doi.org/10.1002/nla.2258>.
- [2] Torsten Bosse and Sri Hari Krishna Narayanan. Study of the numerical efficiency of structured abs-normal forms. *Optimization, Methods and Software*, 2019. Online available: <http://dx.doi.org/10.1080/10556788.2019.1613654>.
- [3] Torsten Bosse. Augmenting the one-shot framework by additional constraints. *Optimization Methods and Software*, 2016. Online available: <http://dx.doi.org/10.1080/10556788.2016.1180692>.
- [4] Andreas Griewank, Andrea Walther, Sabrina Fiege, and Torsten Bosse. On lipschitz optimization based on gray-box piecewise linearization. *Mathematical Programming*, pages 1–33, 2015.
- [5] Torsten Bosse and Andreas Griewank. Optimal control of beer fermentation processes with lipschitz-constraint on the control. *Journal of the Institute of Brewing*, 120(4):444–458, 2014.
- [6] Andreas Griewank, Jonathan Fischer, and Torsten Bosse. Cubic Overestimation and Secant Updating for Unconstrained Optimization of $C^{2,1}$ Functions. *Optimization Methods Software*, 29(5):1075–1089, 2014.
- [7] Torsten Bosse, Lutz Lehmann, and Andreas Griewank. Adaptive sequencing of primal, dual, and design steps in simulation based optimization. *Computational Optimization and Applications*, pages 1–30, 2013.
- [8] Torsten Bosse, Levis Eneya, and Andreas Griewank. An algorithm for pointwise evaluation of polyconvex envelopes II: generalization and numerical results. *Afrika Matematika*, pages 1–22, 2013.
- [9] Levis Eneya, Torsten Bosse, and Andreas Griewank. A method for pointwise evaluation of polyconvex envelopes. *Afrika Matematika*, 24:1–24, 2013.

REFEREED ARTICLES IN PROCEEDINGS

- [10] Torsten Bosse, Ralf Seidler and H. Martin Bückner. Efficient signed backward substitution for piecewise affine functions via path problems in a directed acyclic graph. In M. Bender, J. Gilbert, B. Hendrickson, and D. B. Sullivan, editors, *Proceedings of the 2021 SIAM Conference on Applied and Computational Discrete Algorithms (ACDA21)*, pages 171–181. SIAM, 2021
- [11] Torsten Bosse, Nicolas R. Gauger, Andreas Griewank, Stefanie Günther, and Volker Schulz. One-shot approaches to design optimization. In Günter Leugering et al, editors, *Trends in PDE Constrained Optimization*, volume 165 of *International Series of Numerical Mathematics*, pages 43–66. Springer International Publishing, 2014.
- [12] Torsten Bosse, Nicolas R. Gauger, Andreas Griewank, Stefanie Günther, Lena Kalland, Claudia Kratzenstein, Lutz Lehmann, Anil Nemili, Emre Özkaya, and Thomas Slawig. Optimal design with bounded retardation for problems with non-separable adjoints. In Günter Leugering et al, editors, *Trends in PDE Constrained Optimization*, volume 165 of *International Series of Numerical Mathematics*, pages 67–84. Springer International Publishing, 2014.
- [13] Torsten Bosse, Andreas Griewank, Rene Henrion, Dietmar Hömberg, Chantal Landry, Hernan Leovey, and Werner Römisch. Nonlinear programming with applications to production processes. In Peter Deuffhard et al, editors, *MATHEON-Mathematics for Key Technologies*, volume 1. European Mathematical Society, 2014.
- [14] Torsten Bosse and Andreas Griewank. The Relative Cost of Function and Derivative Evaluations in the CUTer Test Set. In Shaun Forth, Paul Hovland, Eric Phipps, Jean Utke, and Andrea Walther, editors, *Recent Advances in Algorithmic Differentiation*, volume 87 of *Lecture Notes in Computational Science and Engineering*, pages 233–240. Springer Berlin Heidelberg, 2012.
- [15] Torsten Bosse, Andreas Griewank, Lutz Lehmann, and Volker Schloßhauer. On Hessian- and Jacobian-Free SQP Methods - a Total Quasi-Newton Scheme with Compact Storage. In Moritz Diehl, Francois Glineur, Elias Jarlebring, and Wim Michiels, editors, *Recent Advances in Optimization and its Applications in Engineering*, pages 63–72. Springer Berlin Heidelberg, 2010.

OTHER PUBLICATIONS

- [16] Torsten Bosse, Sri Hari Krishna Narayanan, and Laurent Hascoët. Piecewise Linear AD via Source Transformation. 2016. Extended Abstract, AD 2016 in Oxford, UK.
- [17] Mahesh Narayanamurthi, Torsten Bosse, Krishna Narayanan, and Paul Hovland. AD-Suite - A Test Suite for Algorithmic Differentiation. 2016. Extended Abstract, AD 2016 in Oxford, UK.
- [18] Torsten Bosse. *From black box to gray box solver*. PhD thesis, Humboldt-University of Berlin, 2014.
- [19] Torsten Bosse, Andreas Griewank, Lutz Lehmann, and Daniel Schlagk. The magic quadrature of the super-brain (Die magische Quadratur des Superhirns). *Mitteilungen der Deutschen Mathematiker-Vereinigung*, 20:30–36, 2012.
- [20] Torsten Bosse. A derivative-matrix-free NLP solver without explicit nullspace representation. Master’s thesis, Humboldt-University of Berlin, 2009.

MANUSCRIPTS IN PREPARATION

- [21] T. Bosse and H. M. Bückner. Local models of piecewise-normal forms.
- [22] T. Bosse, R. Seidler and K. Wiedom. Evaluation of dense ANFs on GPUs.
- [23] T. Bosse, F. Taubert and H. M. Bückner. Checkpointing for abs-factorable functions.
- [24] T. Bosse. Piecewise linear AD for Pytorch.

WEBPAGES

www.pblas.de Homepage for the project "*Piecewise Basic Linear Algebra System*", currently in development

TEACHING

LECTURES at Friedrich-Schiller-University Jena:
- Algorithmic Differentiation (3 ECTS, multiple)
- Elements of CDS (3 ECTS, multiple)
- Grundlagen der Informations- und Softwaresysteme (6 ECTS)

RECITATIONS at Friedrich-Schiller-University Jena:
- Big Data (6 ECTS, multiple)
- Elektronische Hardware Projekte (6 ECTS, multiple)

SEMINARS at Friedrich-Schiller-University Jena:
- Technische Informatik (3 ECTS, multiple)
- Computational and Data Science (3 ECTS, multiple)
- Oberseminar Advanced Computing (3 ECTS, multiple)
- Rechnerarchitektur (3 ECTS, supporting)

RECITATIONS at Humboldt-University of Berlin:
- Analysis I (10 ECTS, multiple)
- Analysis II (10 ECTS, multiple)
- Analysis III (10 ECTS, multiple)
- Mathematikorientierte Computernutzung (3 ECTS, multiple)
- Mathematik für Informatiker III (10 ECTS)
- Non-linear Optimization (6 ECTS)

SEMINARS at Humboldt-University of Berlin:
- When Zombies Attack! (3 ECTS)

SUPERVISED STUDENTS - GRADUATED

2020	Richard Wiedenhöft, Friedrich-Schiller-University Jena, Master thesis, <i>Check-pointing for composite piecewise linear functions</i>
2019	Paul Rudolph, Friedrich-Schiller-University Jena, Master's thesis, <i>Multigrid Methoden für stückweise lineare Gleichungen in ANF</i>
2019	Konstantin Wiedom, Friedrich-Schiller-University Jena, Bachelor's thesis, <i>Efficient evaluation of signed lower triangular systems on GPUs</i>
2018	Alexander Giemsa, Friedrich-Schiller-University Jena, Master's thesis, <i>Low-Rank-Updates in der stückweisen Linearisierung</i>
2017	Patricia Schäfer, Friedrich-Schiller-University Jena, First state examination for teachers, <i>Effiziente Berechnung von stückweise glatten Funktionen auf Grafikkarten für zeitabhängige Anwendungen</i>
2015/2016	Mahesh Narayanamurthi, Argonne National Laboratory, PhD Summerstudent project, <i>AD-Suite - A test Suite for Algorithmic Differentiation</i>
2013	Adrian Ziessler, Humboldt-University of Berlin, Berlin, Diploma thesis, <i>Numerical Optimization of a Simulated Moving Bed Process using a Total quasi-Newton Approach</i>

PROFESSIONAL ACTIVITIES

Board	<ul style="list-style-type: none">- Member of the admission committee for the program <i>Computational and Data Science</i> at Friedrich-Schiller-University Jena- Member of the Institute Council at Friedrich-Schiller-University Jena- Member of different appointment committees for professorships at Friedrich-Schiller-University Jena
Supervisor	<ul style="list-style-type: none">- Degree theses (B.sc., M.sc.)
Reviewer	<ul style="list-style-type: none">- Degree theses (B.sc., M.sc.)- Research Foundation Flanders- Computational Optimization and Applications- Mathematical Programming- Optimization Methods & Software- SIAM Journal on Scientific Computing- Transaction on Mathematical Software- Zentralblatt der Mathematik
Outreach	<ul style="list-style-type: none">- Founding member of the local CorrelAidX Jena chapter

HUMBOLDT-UNIVERSITÄT ZU BERLIN
MATHEMATISCH-NATURWISSENSCHAFTLICHE FAKULTÄT II



ZEUGNIS

Torsten B o s s e

geboren am 11.11.1981 in Sindelfingen

hat die

DIPLOMPRÜFUNG

im Fach Mathematik

entsprechend der Prüfungsordnung vom 15. Dezember 1998

an der Mathematisch-Naturwissenschaftlichen Fakultät II

der Humboldt-Universität zu Berlin

in einem ordnungsgemäßen Verfahren abgelegt und mit der Gesamtnote

sehr gut 1,5

bestanden.

Thema der Diplomarbeit:

„A Derivative-matrix-free NLP Solver Without Explicit Nullspace Representation“

Note der Diplomarbeit: sehr gut 1,4

HUMBOLDT-UNIVERSITÄT ZU BERLIN

URKUNDE

Die Mathematisch-Naturwissenschaftliche Fakultät
der Humboldt-Universität zu Berlin verleiht

Herrn Dipl.-Math. Torsten Falko Bosse
geb. am 11.11.1981 in Sindelfingen

den akademischen Grad

doctor rerum naturalium
(Dr. rer. nat.)

nachdem er seine wissenschaftliche Befähigung im Fach

Mathematik

nachgewiesen hat.

Thema der Dissertation:
Large Scale Optimization
From Black-Box to Gray-Box Solver

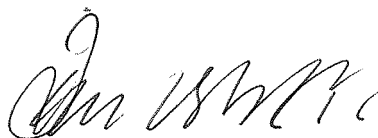
Die Verteidigung fand am 12.08.2014 statt.

Für die Gesamtleistung wurde das Prädikat

magna cum laude

erteilt.

Berlin, den 20.08.2014



Prof. Dr. Jan-Hendrik Olbertz
Präsident der Humboldt-Universität zu Berlin



Prof. Dr. Elmar Kulke
Dekan der Mathematisch-Naturwissenschaftlichen Fakultät



ZERTIFIKAT

LEHRQUALIFIKATION BASIC

Dr. Torsten Bosse

hat erfolgreich das Zertifikatsprogramm „Lehrqualifikation Basic“ abgeschlossen. Im Zertifikatsprogramm werden Lehrende in den Grundlagen der Hochschuldidaktik weitergebildet. Im Mittelpunkt stehen die Weiterentwicklung des eigenen Lehrkonzeptes sowie der Ausbau der individuellen Lehrkompetenz.

Zu den behandelten Themen gehören:

- Lerntheorie und Lernpsychologie
- Planung und Durchführung von Lehrveranstaltungen
- Die Rolle als Lehrende/r und Erwartungen an Studierende
- Methoden für die Hochschullehre
- Evaluation und Feedback
- Prüfung und Bewertung
- Videoaufzeichnung und Feedback zur eigenen Lehrveranstaltung
- Reflexion der eigenen Lehre mittels Lerntagebuch

Darüber hinaus wurden zwei Wahlworkshops im Themenspektrum »Didaktik und Methodik akademischer Lehre« besucht.

Das Programm umfasst 120 Zeitstunden und entspricht 4 ECTS-Credits.

Jena, 23.07.2021

A handwritten signature in blue ink, reading 'Evelyn Hochheim'.

Evelyn Hochheim
Leiterin der Servicestelle LehreLernen