

Dr. Sebastian Sager
Diplom-Mathematiker

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— Personal information —

- Born on march 7th, 1975 in Westerstede; German citizen

— Education and Positions —

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|-----------------|---|
| 10/2008–current | • Junior Research Group Leader at the Interdisciplinary Center for Scientific Computing (IWR), Heidelberg |
| 2/2008–9/2008 | • Akademischer Rat auf Zeit (former C1 assistant professor position, 3+3 years contract) at IWR, Heidelberg |
| 4/2007–1/2008 | • Postdoc in the SIMUMAT research team on aerodynamic shape optimization, Universidad Autónoma, Madrid (E) |
| 10/2006–3/2007 | • Akademischer Rat auf Zeit at IWR Heidelberg |
| 2/2006–9/2006 | • Postdoc at the IWR Heidelberg |
| 2/2002–2/2006 | • PhD thesis <i>Numerical methods for mixed-integer optimal control problems</i> in mathematics, supervised by G. Reinelt and H.G. Bock (grade: summa cum laude) |
| 2/2002–2/2005 | • Member of the International DFG Graduiertenkolleg 710 |
| 2/2004–4/2004 | • Research stays at the Universidad Carlos III de Madrid and the Universidad de Valladolid (E) |
| 10/1995–12/2001 | • Studies at the Universität Heidelberg, diploma in mathematics with specialization in physics/astronomy (grade: excellent) |
| 1/2000–5/2000 | • Exchange student at the University of Ho-Chi-Minh-City (VN) |
| 9/1997–7/1998 | • Exchange student at the Université de Montpellier (F) |
| 1994–1995 | • Military service as a paramedic |
| 6/1994 | • Abitur at the Gymnasium Westerstede |

— Offers, Honors, and Awards —

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| 2007 | • Offer for tenure-track position as scientific investigator at IMDEA-Mathematics, Madrid, not realized |
| 2007 | • Klaus-Tschira-Prize for Understandable Science |
| 2006 | • Dissertation prize of the German Operations Research Society |
| 2004 | • Prize of exzellency for poster presentation at the French–German–Spanish conference on optimization, Avignon |
| 2002–2005 | • Scholarship of the Deutsche Forschungsgemeinschaft |

— Professional experience —

Teaching (Universität Heidelberg)

- 2009
 - Compact course: *Optimization with Differential Equations*
 - Seminar: (with Bastian, Paech): *Scientific Software Engineering*
- 2008–2009
 - Lecture (with S. Körkel): *Introduction to Numerics*
- 2008
 - Lecture: *Mixed-integer Nonlinear and Dynamic Optimization*
 - Seminar: *Artificial Intelligence and Robotics*
- 2006–2007
 - Lecture (with G. Bock): *Optimization with differential equations*
- 2005
 - Lectures within block course *Mixed-integer Programming*
- 2004
 - Lectures within industrial course *Dynamic Process Optimization*
 - C-course with special focus on *Numerics*
- Since 2002
 - Tutoring software practicals and undergraduate students in *Numerics, Optimization, and Computer Science*
- 2002
 - Lectures within block course *Optimization*
- 1999
 - Berufsbildungswerk Oldenburg. Lectures *Internet* and *Linux*

Academic work

- 2009
 - Organizer of the German-American Frontiers of Engineering Symposium 2009
- 2008
 - Co-organizer of industrial modelling workshop OPTeX2008
- 2007
 - Participation in the conception of the *Heidelberg Graduate School of Mathematical and Computational Methods for the Sciences*
 - Organizer and co-chair of the Czech–French–German Conference on Optimization 2007
- 2005
 - Organization of a scientific contribution of the Universität Heidelberg to the *Science Picnic* in Warsaw (100.000 visitors)
- 2002–2005
 - Organization of international workshops *Optimization course, Dynamic process optimization, and Mixed-integer programming*

Reviewing activities

- IEEE Transactions on Automatic Control
- IFAC
- Industrial & Engineering Chemistry Research
- INFORMS Journal on Computing
- Journal of Process Control
- Open Applied Mathematics Journal
- Optimal Control Applications and Methods
- Optimization and Engineering

Nonacademic work

- 10/2006–current
 - Consulting for Daimler(Chrysler), Stuttgart
- 4/2001–6/2001
 - Work as a programmer for Cs2 Informatik, Heidelberg
- 1/2000–5/2000
 - Trainee in the logistics department of Mercedes–Benz Vietnam
- 1997–2000
 - Project work "Optimum Experimental Design" with BASF

— Publications —

Books

- 2005 • Sager, S., *Numerical methods for mixed-integer optimal control problems*, Der Andere Verlag, Tönning, Lübeck, Marburg, ISBN 3-89959-416-9, available at <http://sager1.de/sebastian/downloads/Sager2005.pdf>

Book contributions

- 2008 • L. Grüne, S. Sager, F. Allgöwer, H.G. Bock, M. Diehl, *Vorausschauend planen, gezielt handeln – über die Regelung und Steuerung technischer Prozesse*, acatech, Eds. M. Grötschel, K. Lucas, and V. Mehrmann, Produktionsfaktor Mathematik, ISBN 978-3-8167-7642-0, pp. 27–62

Journal publications

- 2009 • Sager, S., Reinelt, G., Bock, H.G., *Direct Methods With Maximal Lower Bound for Mixed-Integer Optimal Control Problems*, **Mathematical Programming**, Vol. 118(1), pp. 109–149
- Sager, S., *Reformulations and Algorithms for the Optimization of Switching Decisions in Nonlinear Optimal Control*, Optimization Online, 2008, Vol. 11, pp. 1–26, accepted by **Journal of Process Control**
- Kirches, C., Sager, S., Bock, H.G., Schlöder, J.P., *Time-optimal control of automobile test drives with gear shifts*, accepted by **Optimal Control Applications and Methods**
- 2008 • Brandt-Pollmann, U., Winkler, R., Sager, S., Moslener, U., Schlöder, J.P., *Numerical Solution of Optimal Control Problems with Constant Control Delays*, **Computational Economics**, Vol. 31(2), pp. 181–206
- Shaik, O.S., Sager, S., Slaby, O., Lebiedz, D., *Phase tracking and restoration of circadian rhythms by model-based optimal control*, **IET Systems Biology**, Vol. 2, pp. 16–23
- 2007 • Sager, S., *Von diskreten Mathematikern und Wanderungen im Gebirge*, **Bild der Wissenschaft plus**, Vol. 11, pp. 12–15, available at http://www.klaus-tschira-preis.info/BDW_2007.pdf
- Slaby, O., Sager, S., Shaik, O.S., Kummer, U., Lebiedz, D., *Optimal control of self-organized dynamics in cellular signal transduction*, **Mathematical and Computer Modelling of Dynamical Systems**, Vol. 13, pp. 487–502
- Sager, S., Brandt-Pollmann, U., Diehl, M., Lebiedz, D., Bock, H.G., *Exploiting system homogeneities in large scale optimal control problems for speedup of multiple shooting based SQP methods*, **Computers & Chemical Engineering**, Vol. 31, pp. 1181–1186
- 2006 • Sager, S., *Numerische Methoden für Probleme der gemischt-ganzzahligen Optimalen Steuerung*, **OR News**, 28, pp. 30–31
- König, R., Schramm, G., Oswald, M., Seitz, H., Sager, S., Zapatka, M., Reinelt, G., Eils, R., *Discovering functional gene expression patterns in the metabolic network of Escherichia coli with wavelet transforms*, **BMC Bioinformatics**, 7:119
- 2005 • Lebiedz, D., Sager, S., Bock, H.G., Lebiedz, P., *Annihilation of limit-cycle oscillations by identification of critical perturbing stimuli via mixed-integer optimal control*, **Physical Review Letters**, 95, 108303

— Publications (continued) —

- Brandt-Pollmann, U., Lebiedz, D., Diehl, M., Sager, S., Schlöder, J.P., *Real-time nonlinear feedback control of pattern formation in (bio)chemical reaction–diffusion processes: A model study*, **Chaos**, 15, 033901, selected for online-publication in **Virtual Journal of Biological Physics Research**, July 15, 2005

Proceedings publications

- 2008 • S. Sager, C. Kirches, H.G. Bock, *Fast solution of periodic optimal control problems in automobile test-driving with gear shifts*, **IEEE CDC08 Proceedings**, ISBN: 978-1-4244-3124-3
- 2007 • Sager, S., Diehl, M., Singh, G., Küpper, A., Engell, S., *Determining SMB superstructures by mixed–integer optimal control*, Proceedings OR 2006, Eds. K.-H. Waldmann, U.M. Stocker, Springer, pp. 37–44
- 2006 • Lebiedz, D., Sager, S., Shaik, O.S., Slaby, O., *Optimal control of self-organized dynamics in cellular signal transduction*, Proceedings of the 5th Vienna Symposium of Mathematical Modeling, Vienna, Argesim Rep. 30
- Sager, S., Bock, H.G., Diehl, M., Reinelt, G., Schlöder, J.P., *Numerical methods for optimal control with binary control functions applied to a Lotka–Volterra type fishing problem*, Recent Advances in Optimization, pp. 269–283, Springer, Heidelberg
 - G. Schramm, M. Oswald, H. Seitz, S. Sager, M. Zapatka, G. Reinelt, R. Eils, R. König, *Pattern recognition of gene expression data on biochemical networks with simple wavelets transforms*, Proceedings of the KDML 2006: Knowledge Discovery, Data Mining, and Machine Learning, 9.-13. October, Hildesheim, pp. 350–355
- 2005 • Körkel, S., Qu, H., Rücker, G., Sager, S., *Derivative Based vs. Derivative Free Optimization Methods for Nonlinear Optimum Experimental Design*, Proceedings of HPCA2004 Conference, pp. 339–345, Springer, Shanghai

Other publications

- 2009 • Sager, S., Bock, H.G., Diehl, M., *The Integer Approximation Error in Mixed–Integer Optimal Control*, Optimization Online, Vol.2, submitted to **Mathematical Programming A**
- 2008 • Sager, S., *Weltenrechner*, newspaper article on March 9th in the **Rhein–Pfalz am Sonntag**
- Sager, S., *¿Puede convertirse la ciencia en algo comprensible?*, online article for the **Comunidad de Madrid**, January 29th
 - Sager, S., Bock, H.G., Diehl, M., *Solving Mixed–integer Control Problems by Sum Up Rounding With Guaranteed Integer Gap*, IWR Preprint
- 2007 • Voss, C., Sager, S., *Erklären können, was man eigentlich den ganzen Tag macht*, interview, **UniSpiegel**, Heidelberg, Vol. 4, pp. 3, available at <http://www.uni-heidelberg.de/presse/unispiegel/us07-4/erkl.html>
- 2006 • Brandt-Pollmann, U., Winkler, R., Sager, S., Moslener, U., Schlöder, J.P., *Numerical Solution of Optimal Control Problems with Constant Control Delays*, Report, available at <http://ssrn.com/abstract=948137>