Pascal Richter

Curriculum Vitae

Personal Data

Date of Birth: 13/05/1982

Nationality: German

Marital Status: Father of three children (6, 8 and 10 years)

Experience

since 05/2018 **Postdoctoral Position in Computer Science**,
Steinbuch Centre for Computing, Karlsruhe Institute of Technology, Germany
Research group Theory of Hybrid Systems, RWTH Aachen University, Germany.

07/2017-04/2018 **Postdoctoral Position in Mathematics**,
Research group for Continuous Optimization, RWTH Aachen University, Germany.

06/2011–06/2017 **PhD-Candidate**,
MathCCES, Department of Mathematics, RWTH Aachen University, Germany.

01/2008-03/2008 **Internship**, *Swiss-German University*, Jakarta, Indonesia.
Teaching position in Mathematics for students of the curriculum Life Science

10/2007-12/2007 **Internship**, *Shanxi University*, Taiyuan, China.
Problem solving in Graph Theory

Education

06/2017 **PhD**, *MathCCES, Department of Mathematics, RWTH Aachen University,* Germany
- *Grade: Summa cum laude*
- *Topic: Simulation and Optimization of Solar Thermal Power Plants*
- *Scholarship of the Friedrich Naumann Stiftung für die Freiheit.*

05/2011 **Diploma in Mathematics**, *RWTH Aachen University,* Germany
- *Grade: Very good with distinction*
- *Topic: Modeling and Simulation of Two-Phase Flow in Line-Focusing Solar Collector Systems*
- *Term abroad (2005/06) at Université des Antilles, France.*

12/2010 **Diploma in Computer Science**, *RWTH Aachen University,* Germany
- *Grade: Very good*
- *Topic: Optimization of Solar Thermal Power Plants Using Genetic Algorithms and Artificial Neural Networks.*

Awards

06/2018 Awarded the **Borchers Medal** of the RWTH Aachen University which honors outstanding doctoral graduates.

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09/2012 **Best Presentation Award** at the annual meeting of the German Mathematical Society (DMV) in Saarbrücken, Germany.

06/2012 Awarded the **Springorum Medal** of the RWTH Aachen University which honors outstanding graduates.

Research Grants

06/2019–10/2019 **Open Project Funding**,
Research grant of State Key Laboratory of Industrial Control Technology *for research visits at Zhejiang University in Hangzhou, China, 6 000 €.*

07/2012–06/2017 **PhD Scholarship**,
Scholarship of Friedrich Naumann Stiftung für die Freiheit, *four years a 75% position at University.*

Research Funding

10/2019–10/2021 **BMWi funded Third-Party Research Project**,
- *Funding: Federal Ministry for Economic Affairs and Energy (BMWi) via ZIM*
- *Topic: Digitalization of Climate Control in Buildings Using Artificial Intelligence (DEOKI)*
- *Research partners: MeteoViva GmbH*
- *Duration: Two years, own funding of 128 000 €.*

11/2017–10/2018 **DFG funded Seed Fund Project**,
- *Funding: DFG via RWTH Aachen Excellence Cluster*
- *Topic: Optimal Control in Solar Thermal Power Plants*
- *Duration: One year, own funding of 30 000 €.*

11/2017–10/2018 **DFG funded Seed Fund Project**,
- *Funding: DFG via RWTH Aachen Excellence Cluster*
- *Topic: Optimal Robust Aiming Strategies in Solar Tower Power Plants*
- *Duration: One year, own funding of 30 000 €.*

10/2016–09/2017 **DFG funded Seed Fund Project**,
- *Funding: DFG via RWTH Aachen Excellence Cluster*
- *Topic: Simulation and Control of Direct Steam Generating Solar Thermal Power Plants*
- *Duration: One year, own funding of 30 000 €.*

01/2015–12/2015 **DFG funded Seed Fund Project**,
- *Funding: DFG via RWTH Aachen Excellence Cluster*
- *Topic: Modeling and Optimization of Offshore Wind Farms*
- *Duration: One year, own funding of 30 000 €.*

04/2015–03/2018 **BMWi funded Third-Party Research Project**,
- *Funding: Federal Ministry for Economic Affairs and Energy (BMWi) via Solar-ERA.NET*
- *Topic: Optimal Heliostat Fields for Solar Tower Power Plants (SolFieOpt)*
- *Research partners: TSK Flagsol, University of Seville*
- *Duration: Three years, own funding of 260 000 €.*

Teaching Activities

Teaching Assignments

since 2012 **Teaching Assistant for Seminars & Labs**
Supervisor for 59 seminars, project works and labs (each with 3 to 12 students)
RWTH Aachen University, Germany

2012–2017 **Teaching Assistant for Lectures**
Supervisor for CES students in classes Mathematics 1 to 5.
RWTH Aachen University, Germany

2012–2018 **Teaching Assistant for Edulabs**
Supervisor for several high school classes (each with 24 high school students)
RWTH Aachen University, Germany

Master's Thesis Advisor at RWTH Aachen University, Germany

2021 C. von Oy, *Optimal Scheduling of Renewable Energy Consumption Considering Uncertainties*

2021 L. Aldenhoff, *Accelerated Raytracer for Central Receiver using GPUs*

2021 V. Panichkin, *Augmented reality for the visualization of wind farms*

2021 M. Thelen, *Quantification of Uncertainties and Determination of Sensitivities for Biogeochemical Ocean Simulations*

2020 S. Bender, *Resource Optimized Scheduling of Scientific Simulations on CPU and GPU Computing Platforms*

2020 L. Vollmann, *Evolutionary Optimization of Wind Farm and Heliostat Layouts*

2020 N. von Stein, *Nowcasting of Cloud Shadows using Neural Networks*

2019 S. Coumbassa, *Optimal Storage Strategy for Solar Tower Power Plants*

2019 M. Maghnie, *Simulation and Layout Optimization of Offshore Wind Farms*

2019 A. Sachtje, *Predictive Control of the Flow in Networks of Tubes in Solar Thermal Power Plants*

2018 L. Franke, *Simulation and Optimization of Solar Tower Power Plants*

2017 L. Netz, *Analysis on Discretization of Gene Parameters in Evolutionary Algorithms*

2017 G. Heiming, *Development of a Techno-Economic Mdel for Solar Tower Power Plants*

2017 P. Luckner, *Optical and Electrical Simulation of Solar Cells*

2017 M. K. Lal, *Solar Tower Heliostat Field Layout Optimization - A Black-Box Optimizer*, IIT Madras, India

2016 J. Wolters, *Uncertainty Quantification Wind Farm Models*

2016 L. Gerdes, *Generation of Probabilistic Models for Solar Thermal Power Plants*

2013 G. Jennessen, *Optimierung eines Heliostatenfeldes unter Einsatz eines genetischen Algorithmus*

Bachelor's Thesis Advisor at RWTH Aachen University, Germany

2021 A. Herzog, *Optimal Layout of Wind Farms with Different Hub Heights* (under development)

2021 P. Chrestin, *Augmented Reality for the Visualization of Wind Farms with Obstacle Detection* (under development)

2021 M. Elgayar, *Interactive Visualization of Shadow Cast for Wind Farms*

2021 A. Timanov, *Visualization of the noise propagation in wind farms*

2021 L. Fischer, *Multi-step layout optimization of heliostat fields in central receiver systems*

2020 J. Germann, *Optimal climate control in buildings using linear programming*

2020 S. Klemp, *Classification and prediction of thermodynamic value ranges based on geometrical building data*

2020 F. Lockemann, *Optimal control strategy for a virtual renewable power plant*

2020 P. Schulz, *3D Visualization of OpenStreetMap GIS Data in WebGL*

2020 Z. Gong, *Optimal control of volume flow in parabolic trough solar thermal power plants*

2020 Y. Lo, *Multi-step layout optimization of wind turbines in offshore wind farms*

2020 L. Heilmeyer, *Modeling Noise of Wind Turbines*

2020 N. Speetzen, *Accelerated Aiming Strategy for Central Receiver Systems with Integer Linear Optimization Using Heuristics*

2019 F. Hövelmann, *Advanced Raytracer for Solar Tower Power Plants*

2019 K. Yaneva, *Optimized Control for Climate in Buildings Using Artificial Intelligence*

2019 C. Schmidt Muniz, *GPU Raytracer for Solar Tower Power Plants*, Karlsruhe Institute of Technology, Germany

2017 J. Düstersiek, *Uncertainty Quantification and Multi-Objective Optimization of Wind Farms*

2018 M. Cherek, *Control of the Temperature in a Network of Tubes of Solar Thermal Power Plants*

2018 F. Kepp, *Robust Optimization of Aiming Strategies of Heliostats in Solar Tower Power Plants*

2018 T. von Platen, *Optimal Cable Routing of Heliostats in Solar Tower Power Plants Using Integer Linear Programming*

2018 G. Wicke, *Optimization of Aiming Strategies for Heliostats in Solar-Thermal Power Plants*

2017 F. Ossenbrink, *Shortest Cable Routing of Heliostats in Solar Tower Power Plants*

2017 R. Cakar, *Uncertainty Quantification of Wind Farm Models*

2017 J. Tinnes, *Acceleration of Ray-Tracer Models for the Simulation of Solar Tower Power Plants with Real Weather Data*

2016 P. Cremerius, *Optimal Cable Layout for Offshore Wind Farms by Integer Linear Optimization*

2016 J. Lust, *Shortest Cable Routing in Offshore Wind Farms*

2015 G. Heiming, *Modeling and Simulation of Offshore Wind Farms*

List of Publications

Patents

1 EP 211 94 352.7: Verfahren und System zur Steuerung von Lasten in einem Gebäude, September 1, 2021.

Peer-reviewed original articles

1 S. Klemp, A. Abida, **P. Richter**; *A method and Analysis of Predicting Building Material U-Value Ranges Through Geometrical Pattern Clustering*. Journal of Building Engineering, 44 (2021): 103243. DOI:10.1016/j.jobe.2021.103243.

2 N. Speetzen, **P. Richter**; *Dynamic Aiming Strategy for Central Receiver Systems*. Journal of Renewable Energy, 180 (2021): 55–67. DOI:10.1016/j.renene.2021.08.060.

3 **P. Richter**, T. Trimborn, L. Aldenhoff; *Predictive Storage Strategy for Optimal Design of Hybrid CSP-PV Plants With Immersion Heater*. Journal of Solar Energy, 218 (2021): 237–250. DOI:10.1016/j.solener.2020.11.005.

4 **P. Richter**, J. Tinnes, L. Aldenhoff; *Accurate Approximation Method for the Annual Simulation of Solar Central Receiver Systems Using Celestial Coordinate System*. Journal of Solar Energy, 213 (2021): 328–338. DOI:0.1016/j.solener.2020.10.087.

5 S. Kuhnke, **P. Richter**, F. Kepp, J. Cumpston, A. Koster, C. Büsing; *Robust Optimal Aiming Strategies in Concentrated Solar Tower Power Plants*. Journal of Renewable Energy, 152 (2020), 198–207. DOI:0.1016/j.renene.2019.11.118.

6 M. Frank, **P. Richter**, C. Roeckerath, S. Schönbrodt;
Wie funktioniert eigentlich GPS? Ein computergestützter Modellierungsworkshop, In: Digitale Werkzeuge, Simulationen und mathematisches Modellieren. Springer Spektrum, Wiesbaden, (2018): 137-163. DOI:10.1007/978-3-658-21940-6_7.

7 S. Müller, M. Hantke, **P. Richter**; *Closure Conditions for Non-Equilibrium Multi-Component Models*. Continuum Mechanics and Thermodynamics, 28.4 (2016): 1157-1189. DOI:10.1007/s00161-015-0468-8.

Peer-reviewed conference contributions

1 L. Aldenhoff, **P. Richter**; *Accelerating Raytracers for Central Receiver Systems using a GPU*. AIP Conference Proceedings, AIP Publishing (2021). [Accepted]

2 **P. Richter**, F. Hövelmann; *Computationally Fast Analytical Ray-Tracer for Central Receiver Systems*. AIP Conference Proceedings, AIP Publishing (2020). [Accepted]

3 **P. Richter**, N. Speetzen; *Accelerated Aiming Strategy in Central Receiver Systems Using Integer Linear Programming*. AIP Conference Proceedings, AIP Publishing (2020). [Accepted]

4 T. Reuscher, L. Pyta, T. Konrad, **P. Richter**, D. Abel; *Proper Orthogonal Decomposition and Bilinear Lyapunov Control of Parabolic Trough Collectors*. 27th Mediterranean Conference on Control and Automation. IEEE (2019), 439–444. DOI:10.1109/MED.2019.8798520.

5 **P. Richter**, F. Kepp, C. Büsing, S. Kuhnke; *Optimization of Robust Aiming Strategies in Solar Tower Power Plants*. AIP Conference Proceedings, AIP Publishing (2018). DOI:10.1063/1.5117557.

6 **P. Richter**, J. Tinnes, P. Schwarzbözl, A. Rong, M. Frank; *Efficient Ray-Tracing with Real Weather Data*. SolarPACES Conference 2017, AIP Conference Proceedings (Vol. 2033, No. 1, pp. 210014). AIP Publishing (2017). DOI:10.1063/1.5067216

7 **P. Richter**, G. Heiming, N. Lukas, M. Frank; *SunFlower: A New Solar Tower Simulation Method for Use in Field Layout Optimization*. SolarPACES Conference 2018, AIP Conference Proceedings (Vol. 2033, No. 1, p. 210015). AIP Publishing (2017). DOI:0.1063/1.5067217.

8 **P. Richter**, D. Laukamp, L. Gerdes, M. Frank, E. Ábrahám; *Heliostat Field Layout Optimization with Evolutionary Algorithms*. 2nd Global Conference on Artificial Intelligence (GCAI), EPiC Series in Computing (Vol. 41, pp. 240-252). EasyChair (2016). DOI:10.29007/7p6t.

9 C. A. Domínguez-Bravo, S. J. Bode, G. Heiming, **P. Richter**, E. Carrizosa, E. Fernández-Cara, M. Frank, P. Gauché; *Field-Design Optimization With Triangular Heliostat Pods*. SolarPACES Conference 2016, AIP Conference Proceedings (Vol. 1734, No. 1, pp. 070006). AIP Publishing, (2016). DOI:10.1063/1.4949153.

10 **P. Richter**, M. Frank, E. Ábrahám; *Multi-objective Optimization of Solar Tower Power Plants*. 18th European Conference on Mathematics for Industry (ECMI), Progress in Industrial Mathematics (Vol. 22, pp. 771-778). Springer (2014). DOI:10.1007/978-3-319-23413-7_107.

11 **P. Richter**, E. Ábrahám, G, Morin; *Optimisation of Concentrating Solar Thermal Power Plants with Neural Networks*. 10th International Conference on Adaptive and Natural Computing Algorithms (ICANNGA), LNCS (Vol. 6593, pp. 190-199). Springer (2013). DOI:10.1007/978-3-642-20282-7_20.

12 G. Morin, **P. Richter**, P. Nitz;
New Method and Software for Multi-Variable Techno-Economic Design Optimisation of Parabolic Trough Power Plants
Proceedings of the 16th SolarPACES International Conference (2010).

Graduation works

PhD Thesis

Simulation and Optimization of Solar Thermal Power Plants (2017).
Supervisor: Prof. M. Frank (RWTH Aachen University)

Diploma Theses

Modeling and Simulation of Two-Phase Flow in Line-Focusing Solar Collector Systems (2011). Diploma thesis in Mathematics.
Supervisor: Prof. M. Frank (RWTH Aachen University)

Optimization of Solar Thermal Power Plants Using Genetic Algorithms and Artificial Neural Networks (2009). Diploma thesis in Computer Science.
Supervisor: Prof. E. Ábrahám (RWTH Aachen University)

Conference Presentations

2020 *Computationally Fast Analytical Ray-Tracer for Central Receiver Systems*
SolarPACES Conference, 2020, Albuquerque, USA.

2020 *Accelerated Aiming Strategy in Central Receiver Systems Using Integer Linear Programming*
SolarPACES Conference, 2020, Albuquerque, USA.

2018 *Optimization of Robust Aiming Strategies in Solar Tower Power Plants*
SolarPACES Conference, 2018, Casablanca, Morocco.

2017 *Efficient Ray-Tracing with Real Weather Data*
SolarPACES Conference, 2017, Santiago, Chile.

2017 *SunFlower: A New Solar Tower Simulation Method for Use in Field Layout Optimization*
SolarPACES Conference, 2017, Santiago, Chile.

2016 *Heliostat Field Layout Optimization with Evolutionary Algorithms*
2nd Global Conference on Artificial Intelligence (GCAI), 2016, Berlin, Germany.

2016 *Field-Design Optimization With Triangular Heliostat Pods*
SolarPACES Conference, 2016, Cape Town, South Africa.

2014 *Multi-objective Optimization of Solar Tower Power Plants*
18th European Conference on Mathematics for Industry (ECMI), 2014, Taormina, Italy.

2011 *Optimisation of Concentrating Solar Thermal Power Plants with Neural Networks*
International Conference on Adaptive and Natural Computing Algorithms (ICANNGA), 2011, Ljubljana, Slovenia.

Reviewer

2021 *Journal Renewable Energy (Elsevier)*

2021 *Energies (MDPI)*

2020 *International Journal of Modern Physics C (World Scientific)*

2019 *International Journal of Heat and Fluid Flow (Elsevier)*

2018 *Informs Journal on Computing*

2018 *AIP Conference Proceedings* (for the SolarPACES Conference)

Organization of Conferences or Workshops

- *Solar Workshop – Computational and Mathematical Modeling for the Design of Solar Tower Power Plants*, July 2017, Aachen, Germany,
`http://www.energy.rwth-aachen.de/workshop.html`.

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