

## Curriculum Vitae

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**Dr.-Ing. Christoph Meier**

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date of birth 25.02.1984  
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personal married and two children



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**Professional Career**

- 02/2018 – **Lecturer, Deputy Head of Institute and Leader of AM Group**  
Institute for Computational Mechanics (Head: Prof. W.A. Wall), TUM,  
Scientific co-supervision of eight full-time Ph.D. students at TUM and one full-time Ph.D. student at MIT
- 08/2016 – 01/2018 **Postdoctoral Fellow**  
Mechanosynthesis Group (Head: Prof. A.J. Hart),  
Massachusetts Institute of Technology (MIT),  
Research project: “Advanced physics-based modeling of metal additive manufacturing processes across length scales”
- 07/2010 – 07/2016 **Research and Teaching Associate**  
Institute for Computational Mechanics, TUM

**Education**

- 07/2016 **Ph.D. Mechanical Engineering (Dr.-Ing.), TUM**  
Doctoral thesis: “Geometrically exact finite element formulations for slender beams and their contact interaction”,  
Passed with high distinction (summa cum laude), GPA 1.0,  
Examination committee: Prof. Ewald Werner (chairman),  
Prof. Wolfgang A. Wall, Prof. Ignacio Romero (examiners)
- 07/2010 **Diploma Mechanical Engineering (Dipl.-Ing. Univ.), TUM**  
Diploma thesis: “Development of a finite element for non-linear beams based on the Frenet-Serret formulas”,  
Institute for Computational Mechanics, TUM,  
Passed with high distinction (summa cum laude), GPA 1.0,  
Ranked no. 1 out of 3580 examinees in the period from summer term 2007 (begin of recordings) until winter term 2014/15
- 10/2007 **Intermediate Examination Mechanical Engineering, TUM**  
Passed with high distinction (summa cum laude), GPA 1.2,  
Ranked no. 1 out of 679 examinees within the academic year 2006/07
- 10/2005 – 07/2010 **Diploma Studies Mechanical Engineering, TUM**  
Specialization in “Materials Engineering” and  
“Fundamentals in Engineering Sciences”
- 07/2005 **High-School Diploma (Fachgeb. Hochschulreife), BOS Landshut**  
Passed with high distinction (summa cum laude), GPA 1.0

- 09/2003 – 07/2005 **Upper Vocational School (BOS) Landshut**  
Continuation education after apprenticeship
- 07/2003 **Certificate of Apprenticeship (Gesellenbrief)**  
Passed with high distinction (summa cum laude), GPA 1.0
- 09/2000 – 07/2003 **Apprenticeship as Tool Mechanic at BMW AG, Dingolfing**  
Abbreviated apprenticeship due to excellent performance  
Focus on tooling and manufacturing technologies

### Parental Leaves

- 03/2019 – 05/2020 **Three-Month Parental Leave and Six-Month Part-Time Work**
- 07/2021 – 08/2021 **Two-Month Parental Leave**

### Honors and Awards

- 07/2017 **Rudolf Schmidt-Burkhardt Memorial Prize of TUM**  
With an endowment of 10.000 Euro, this is the highest PhD award in the Department of Mechanical Engineering of TUM
- 04/2017 **Finalist of the ECCOMAS Award for the Best PhD Thesis of 2016 on Computational Methods in Applied Sciences and Engineering**  
The prize has been granted by the European Community on Computational Methods in Applied Sciences (ECCOMAS)
- 03/2017 **Dr.-Klaus-Körper Prize for the Best PhD Thesis of 2016 in the Fields of Applied Mathematics and Mechanics**  
The prize has been granted by the international Association of Applied Mathematics and Mechanics (GAMM)
- 01/2017 **GAMM Juniors Fellowship of the International Association of Applied Mathematics and Mechanics (GAMM)**  
Every year, only 10 candidates are selected based on an excellent Ph.D. thesis in the fields of Applied Mathematics or Mechanics
- 03/2016 **Postdoctoral Fellowship (18 months) of the German Academic Exchange Service (DAAD)**
- 07/2015 **Ranked as Best Diploma Graduate in Mechanical Engineering at TUM since recordings began in 2007**  
No. 1 out of 3580 examinees from summer term 07 - winter term 14/15
- 12/2012 **Teaching Award of the Bavarian State Government**  
Only one assistant lecturer out of all Bavarian universities receives this annual award
- 05/2012 **Golden Needle and Award for Excellence in Teaching of TUM**
- 07/2012 **Teaching Award within the Annual Teaching Evaluation of the Department of Mechanical Engineering, TUM**
- 07/2011 **Teaching Award within the Annual Teaching Evaluation of the Department of Mechanical Engineering, TUM**
- 07/2011 **Award for the Best Final Degree in Mechanical Engineering in the Academic Year 2010/2011, TUM**
- 11/2010 **CADFEM and ANSYS Diploma Thesis Award**  
Awarded for an excellent diploma thesis in engineering
- 10/2007 – 07/2010 **Full Scholarship of the German National Academic Foundation**  
Less than 1% of all students were granted this scholarship

- 03/2007 – 06/2010      **Member of the BMW Mentoring Program “Fastlane”**  
Less than 5% of BMW trainees / interns were granted this scholarship
- 07/2005                  **Award for the Best High School Diploma at the Upper Vocational School (BOS) Landshut in 2005**

### **Professional Service**

- 11/2021 –                  **GAMM Fachausschuss "Moderne Lehre und Didaktik in der Mathematik und Mechanik"**
- 06/2018 –                  **Organization of Scientific Events Including Minisymposia at Scientific Conferences and a CISM Advanced Course**
- 01/2018 –                  **Mentor for Ph.D. Students in the TUM Graduate School**
- 01/2017 –                  **GAMM Juniors Committee**
- 08/2016 –                  **Reviewer for more than 20 Leading International Journals and Funding Agencies in Engineering Science**
- 07/2010 –                  **Service for the Department of Mechanical Engineering (TUM)**  
Engagement in events such as advanced training courses for high school teachers (“Lehrerfortbildung”), information days for high school students (“Schülerinfotag”), and aptitude tests (“Eignungsfeststellungsverfahren”)

### **Memberships**

- 01/2017 –                  **International Association of Applied Mathematics and Mechanics (GAMM)**
- 11/2016 –                  **European Community on Computational Methods in Applied Sciences (ECCOMAS)**
- 11/2016 –                  **German Association for Computational Mechanics (GACM)**
- 11/2016 –                  **International Association for Computational Mechanics (IACM)**

## Publications

## Overview and Citation Metrics

- 26 articles in peer-reviewed scientific journals (plus 8 currently submitted)
- 2 peer-reviewed proceedings and other articles
- > 30 invited and contributed presentations at international conferences / workshops
- > 1000 citations in total / h-Index of 13 (Google Scholar)
- > 600 citations in total / h-Index of 12 (Scopus)

## Peer-Reviewed International Journal Articles

- [1] Proell, S.D., Munch, P., Wall, W.A., Meier, C. (2023): A High Performance Computing Model Enabling Thermal Simulations of Laser Powder Bed Fusion Processes with Resolved Heat Source Path on the Decimeter Scale, in preparation
- [2] Praegla, P.M., Mair, T., Wimmer, A., Fehn, N., Wall, W.A., Zäh, M.F., Meier, C. (2023): Towards Additively Manufactured Metamaterials with Powder Inclusions for Controllable Dissipation: The Critical Influence of Packing Density, in preparation
- [3] Satheesh, A., Schmidt, C.P., Wall, W.A., Meier, C. (2023): Structure-Preserving Invariant Interpolation Schemes for Invertible Second-Order Tensors, submitted for publication, arXiv preprint arXiv:2211.16507
- [4] Schneider, C., Schmidt, C.P., Neumann, A., Clausnitzer, M., Sadowski, M., Harm, S., Meier, C., Danner, T., Albe, K., Latz, A., Wall, W.A., Lotsch, B.V. (2023): Effect of Particle Size and Pressure on the Transport Properties of the Fast Ion Conductor t-Li<sub>7</sub>SiPS<sub>8</sub>, submitted for publication, ChemRxiv preprint 10.26434/chemrxiv-2022-tvc6l
- [5] Steinbrecher, I., Hagmeyer, N., Meier, C., Popp, A. (2023): A consistent mixed-dimensional coupling approach for 1D Cosserat beams and 2D solid surfaces, submitted for publication, arXiv preprint arXiv:2210.16010
- [6] Penny, R.W., Oropeza, D., Praegla, P.M., Weissbach, R., Meier, C., Wall, W.A., Hart, A.J. (2022): Quantitative analysis of thin metal powder layers via transmission X-ray imaging and discrete element simulation: Blade-based spreading approaches, submitted for publication, arXiv preprint arXiv:2209.04320
- [7] Penny, R.W., Oropeza, D., Praegla, P.M., Weissbach, R., Meier, C., Wall, W.A., Hart, A.J. (2022): Quantitative analysis of thin metal powder layers via transmission X-ray imaging and discrete element simulation: Roller-based spreading approaches, submitted for publication, arXiv preprint arXiv:2209.04303
- [8] Grill, M.J., Wall, W.A., Meier, C. (2022): Analytical disk-cylinder interaction potential laws for the computational modeling of adhesive, deformable (nano)fibers, submitted for publication, arXiv preprint arXiv:2208.03074
- [9] Grill, M.J., Wall, W.A., Meier, C. (2022): Asymptotically consistent and computationally efficient modeling of short-ranged molecular interactions between curved slender fibers undergoing large 3D deformations, submitted for publication, arXiv preprint arXiv:2208.03149
- [10] Meier, C., Grill, M.J., Wall, W.A. (2022): Generalized Section-Section Interaction Potentials in the Geometrically Exact Beam Theory: Modeling of Intermolecular Forces, Asymptotic Limit as Strain-Energy Function, and Formulation of Rotational Constraints, submitted for publication, arXiv preprint arXiv:2105.10032
- [11] Faraji, M., Seitz, A., Meier, C., Wall, W.A. (2022): A mortar finite element formulation for large deformation lubricated contact problems with smooth transition between mixed, elasto-hydrodynamic and full hydrodynamic lubrication, accepted for publication, arXiv preprint arXiv:2201.01095

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- [12] Fuchs, S.L., Praegla, P.M., Cyron, C.J., Wall, W.A., Meier, C. (2022): A versatile SPH modeling framework for coupled microfluid-powder dynamics in additive manufacturing: binder jetting, material jetting, directed energy deposition and powder bed fusion, *Engineering with Computers*, accepted for publication, arXiv preprint arXiv:2201.01677
- [13] Proell, S.D., Wall, W.A., Meier, C. (2021): A simple yet consistent constitutive law and mortar-based layer coupling schemes for thermo-mechanical macroscale simulations of metal additive manufacturing processes, *Advanced Modeling and Simulation in Engineering Sciences*, 8:1-37
- [14] Steinbrecher, I., Popp, A., Meier, C. (2021): Consistent coupling of positions and rotations for embedding 1D Cosserat beams into 3D solid volumes, *Computational Mechanics*, 1-32
- [15] Meier, C., Fuchs, S.L., Much, N., Nitzler, J., Penny, R.W., Praegla, P.M., Proell, S.D., Sun, Y., Weissbach, R., Schreter, M., Hodge, N.E., Hart, A.J., Wall, W.A. (2021): Physics-based modeling and predictive simulation of powder bed fusion additive manufacturing across length scales, *GAMM-Mitteilungen*, published online, doi:<https://doi.org/10.1002/gamm>
- [16] Penny, R.W., Praegla, P.M., Ochsenius, M., Oropeza, D., Weissbach, R., Meier, C., Wall, W.A., Hart, A.J. (2021): Spatial mapping of powder layer density for metal additive manufacturing via transmission X-ray imaging, *Additive Manufacturing*, 46:102197
- [17] Nitzler\*, J., Meier\*, C., Müller, K.W., Wall, W.A., Hodge, N.E. (2021): A novel physics-based and data-supported microstructure model for part-scale simulation of laser powder bed fusion of Ti-6Al-4V, *Advanced Modeling and Simulation in Engineering Sciences*, 8:1-39  
\*shared first-authorship
- [18] Fuchs, S.L., Meier, C., Wall, W.A., Cyron, C.J. (2021): An SPH framework for fluid-solid and contact interaction problems including thermo-mechanical coupling and reversible phase transitions, *Advanced Modeling and Simulation in Engineering Sciences*, 8:15
- [19] Fuchs, S.L., Meier, C., Wall, W.A., Cyron, C.J. (2021): A novel smoothed particle hydrodynamics and finite element coupling scheme for fluid-structure interaction: the sliding boundary particle approach, *Computer Methods in Applied Mechanics and Engineering*, 383:113922
- [20] Grill, M.J., Eichinger, J.F., Koban, J., Meier, C., Lieleg, O., Wall, W.A. (2021): A novel modeling and simulation approach for the hindered mobility of charged particles in biological hydrogels, *Proceedings of the Royal Society A*, 477: 20210039
- [21] Meier, C., Fuchs, S.L., Hart, A.J., Wall, W.A. (2021): A novel smoothed particle hydrodynamics formulation for thermo-capillary phase change problems with focus on metal additive manufacturing melt pool modeling, *Computer Methods in Applied Mechanics and Engineering*, 381:113812
- [22] Steinbrecher, I., Mayr, M., Grill, M.J., Kremheller, J., Meier, C., Popp, A. (2020): A mortar-type finite element approach for embedding 1D beams into 3D solid volumes, *Computational Mechanics*, 66:1377-1398
- [23] Grill, M.J., Meier, C., Wall, W.A. (2019): Investigation of the peeling and pull-off behavior of adhesive elastic fibers via a novel computational beam interaction model, *The Journal of Adhesion*, 1-30
- [24] Grill, M.J., Wall, W.A., Meier, C. (2020): A computational model for molecular interactions between curved slender fibers undergoing large 3D deformations with a focus on electrostatic, van der Waals, and repulsive steric forces, *International Journal for Numerical Methods in Engineering*, 121:2285-2330
- [25] Proell, S.D., Wall, W.A., Meier, C. (2020): On phase change and latent heat models in metal additive manufacturing process simulation, *Advanced Modeling and Simulation in Engineering Sciences*, 7:1-32
- [26] Pattinson, S.W., Huber, M.E., Kim, S., Lee, J., Grunsfeld, S., Roberts, R., Dreifus, G., Meier, C., Liu, L., Hogan, N., Hart, A.J. (2019): Additive manufacturing of biomechanically tailored meshes for compliant wearable and implantable devices, *Advanced Functional Materials*, 29:1901815

- [27] Meier, C., Weissbach, R., Weinberg, J., Wall, W.A., Hart, A.J. (2019): Modeling and characterization of cohesion in fine metal powders with a focus on additive manufacturing process simulations, *Powder Technology*, 343:855-866
- [28] Meier, C., Weissbach, R., Weinberg, J., Wall, W.A., Hart, A.J. (2019): Critical influences of particle size and adhesion on the powder layer uniformity in metal additive manufacturing, *Journal of Materials Processing Technology*, 266:484-501
- [29] Meier, C., Popp, A., Wall, W.A. (2019): Geometrically exact finite element formulations for slender beams: Kirchhoff-Love theory versus Simo-Reissner theory, *Archives of Computational Methods in Engineering*, 26:163-243
- [30] Meier, C., Grill, M., Wall, W.A., Popp, A. (2018): Geometrically exact finite elements and smooth contact schemes for the modeling of fiber-based materials and structures, *International Journal of Solids and Structures*, 154:124-146
- [31] Meier, C., Penny, R., Zou, Y., Gibbs, J.S., Hart, A.J. (2017): Thermophysical phenomena in metal additive manufacturing by selective laser melting: Fundamentals, modeling, simulation and experimentation, *Annual Review of Heat Transfer*, 20:241-316
- [32] Meier, C., Wall, W.A., Popp, A.: Unified approach for beam-to-beam contact (2017), *Computer Methods in Applied Mechanics and Engineering*, 315:972-1010
- [33] Meier, C., Popp, A., Wall, W.A.: A finite element approach for the line-to-line contact interaction of thin beams with arbitrary orientation (2016), *Computer Methods in Applied Mechanics and Engineering*, 308:377-413
- [34] Müller, K.W., Meier, C., Wall, W.A. (2015): The resolution of sub-element length scales in Brownian dynamics of biopolymer networks with geometrically exact beam finite elements, *Journal of Computational Physics*, 303C:185-202
- [35] Meier, C., Popp, A., Wall, W.A. (2015): A locking-free finite element formulation and reduced models for geometrically exact Kirchhoff rods. *Computer Methods in Applied Mechanics and Engineering*, 290:314-341
- [36] Meier, C., Popp, A., Wall, W.A. (2014): An objective 3D large deformation finite element formulation for geometrically exact curved Kirchhoff rods. *Computer Methods in Applied Mechanics and Engineering*, 278:445-478

#### Peer-Reviewed Proceedings and Other Articles

- [37] Wall, W.A., Cyron, C.J., Klöppel, T., Meier, C., Müller, K.W. (2011): Coupled problems on the cellular and sub-cellular scale, 4<sup>th</sup> International Conference on Computational Methods for Coupled Problems in Science and Engineering, Kos Island, Greece
- [38] Müller, K.W., Meier, C., Wall, W.A. (2015): Brownian dynamics simulation of cellular protein networks, *IACM expressions*, 37:2-5

#### Ph.D. Thesis

- [39] Meier, C. (2016): Geometrically exact finite element formulations for slender beams and their contact interaction, TUM

#### 10 Selected Presentations at International Scientific Conferences

- [1] Generalized section-section interaction potentials in the geometrically exact beam theory (**plenary lecture**), International Conference on Highly Flexible Slender Structures, Rijeka, Republic of Croatia, scheduled for September 2023
- [2] Solids (and fluids) in (inter-)action (**plenary lecture**), given by W.A. Wall, 10th International Congress on Computational Mechanics, Virtual Congress, 2021



- [3] A mesoscale powder spreading and melt pool model for metal powder bed fusion additive manufacturing process simulation, 14<sup>th</sup> World Congress in Computational Mechanics (WCCM), Virtual Congress, 2021
- [4] Critical influences of particle size and adhesion on the powder layer uniformity in metal additive manufacturing (**keynote lecture**), 2<sup>nd</sup> International Conference on Simulation for Additive Manufacturing (Sim-AM), Pavia, Italy, 2019
- [5] Metal additive manufacturing by selective laser melting: modeling and simulation approaches across length scales, 13th World Congress on Computational Mechanics (WCCM), New York, USA, 2018
- [6] Geometrically exact finite element formulations for highly slender beams and their interaction: Kirchhoff-Love theory vs. Simo-Reissner theory, 6<sup>th</sup> European Conference on Computational Mechanics (ECCM), Glasgow, UK, 2018
- [7] Nonlinear contact modeling for geometrically exact beam finite element formulations (**plenary lecture**), given by A. Popp, 4<sup>th</sup> ECCOMAS Young Investigators Conference (YIC), Milan, Italy, 2017
- [8] Geometrically exact finite element formulations for slender beams: Kirchhoff-Love theory vs. Simo-Reissner theory, 14<sup>th</sup> US National Congress on Computational Mechanics (USNCCM), Montreal, Canada, 2017
- [9] Modeling of highly slender fibers based on geometrically exact Kirchhoff beam elements and a unified contact approach, Euromech Colloquium 569 – Multiscale modeling of fibrous and textile materials, Châtenay-Malabry, France, 2016
- [10] A finite element approach for contact interaction of thin beams with arbitrary orientation, 4<sup>th</sup> International Conference on Computational Contact Mechanics (ICCCM), Hannover, Germany, 2015

## 5 Selected Other Presentations and Events on Invitation

- [1] Modeling and simulation of powder bed fusion additive manufacturing across length scales, Vulcan Forms, Online Presentation, 2021
- [2] Cosserat continuum models for molecular and macroscale interactions of slender fibers, Leopold-Franzens-Universität Innsbruck, Österreich, 2019
- [3] Modeling of the powder recoating process in metal additive manufacturing, Desktop Metal (DM), Burlington, USA, 2018
- [4] Geometrically exact finite element formulations for slender beams: Kirchhoff-Love theory vs. Simo-Reissner theory, Fraunhofer Institute for Industrial Mathematics (ITWM), Kaiserslautern, 2017
- [5] Invitation to the priority meeting “*Modeling of Powder Dynamics in Metal Additive Manufacturing*”, Austin, USA, 2017

\*Only 100 researchers from industry, U.S. national laboratories, and academia have been selected to identify priority research directions with respect to powder spreading in metal additive manufacturing processes.

## Research

## Research Interests

### *Applications*

- Physics-based modeling and simulation of additive manufacturing (AM) processes including
  - different process technologies:  
powder bed fusion (PBF; main focus)  
binder jetting (BJ),  
material jetting (MJ),  
directed energy deposition (DED).
  - different length scales:  
macroscale (part-scale thermo-solid-mechanics),  
mesoscale (multi-phase flow with phase change, cohesive powders),  
microscale (microstructure evolution).
- Physics-based modeling and simulation of microstructured materials including
  - fiber-based materials and structures with complex fiber arrangements / interactions
  - metamaterials with powder inclusions for controlled dissipation
  - microstructure-informed material models for metals

### *Methods*

- Computer-based continuum mechanics with focus on finite element methods (FEM), discrete element methods (DEM), and smoothed particle hydrodynamics (SPH)
- Solid and structural mechanics
- Mechanics of 1D continua (e.g., geometrically exact beam theories) and their interaction
- Mechanics of granular materials (e.g., cohesive powders)
- Multi-phase flow with solid-liquid and liquid-vapor phase transitions
- Multi-scale and multi-physics modeling
- Coupled thermo-solid and thermo-fluid mechanics
- Material modeling
- Complex interface phenomena (e.g., adhesion, lubrication, surface tension)
- Contact mechanics
- Fluid-Structure Interaction
- Elastohydrodynamic lubrication
- Model order reduction / dimensional reduction
- Coupling of reduced-dimensional structures and 3D continua
- Data-based approaches
- Bayesian schemes for uncertainty quantification and inverse analysis
- Software development
- High performance computing

### Projects and Funding as Principal Investigator

- Datengetriebene Methoden zur Prozessrobustifizierung von Produktionsprozessen  
*Teilprojekt:* Daten- und physikbasierter Multi<sup>4</sup>-Ansatz zur analogiegestützten Modellierung komplexer Produktionsprozessketten  
€ 280,000 / 4 years, 2022-2026 (**under review**)  
SFB-TRR 328, German Research Foundation (DFG), Germany  
Collaboration of TUM and FAU Erlangen-Nürnberg
- In-situ-Metrologie, High-Fidelity Modellierung und inverse Analyse zur physik- und daten-basierten Vorhersage hochgradig nichtlinearen Materialverhaltens und -versagens in der Fertigungstechnik  
€ 400,000 / 2 years, 2023 – 2025 (**under review**)  
German Research Foundation (DFG), Germany  
In collaboration with the Chair of Metal Forming and Casting, TUM
- Scale-up of metal AM by data-based synthesis of simulation and experiment  
€ 18,000 / 18 months, 2022 – 2023  
MIT-Germany Lockheed Martin Seed Fund (MIT), USA
- Advanced finite element modeling of selective laser melting processes  
€ 60,000 / 18 months, 2016 - 2018  
German Academic Exchange Service (DAAD), Germany  
Postdoctoral research fellowship
- Metal additive manufacturing: fundamentals, modeling, materials and implementation  
€ 25,000 / one-time, 2021  
International Center for Mechanical Sciences (CISM), Italy  
CISM Advanced Course
- Highly efficient numerical model for forward and inverse problems in the physics-based simulation of metal additive manufacturing processes on part scale  
€ 245,000 / 3 years, 2020 - 2023  
German Research Foundation (DFG), Germany
- Development, numerical simulation and experimental characterization of selective laser melting (SLM) microstructures with deliberately introduced dissipation  
€ 470,000 / 3 years, 2020 - 2023  
German Research Foundation (DFG), Germany  
In collaboration with the Institute for Machine Tools and Industrial Management, TUM

### Projects and Funding with Significant Contribution

- Combined phase field/DG-FEM modeling of multi-phase flow problems – a modern approach for high-fidelity metal additive manufacturing process simulations  
€ 55,000 / 18 months, 2021 – 2022  
Austrian Science Fund (FWF), Austria  
Erwin Schrödinger Fellowship of Dr. Magdalena Schreter  
Contribution: Proposal conceptualization and writing (co-author), host of fellow
- Physics-based simulation of the powder recoating process and mesoscale melt pool phenomena in metal additive manufacturing  
€ 65,000 / 4 years, 2019 – 2023  
Chinese Scholarship Council (CSC), China  
CSC Fellowship of Mr. Yushen Sun  
Contribution: Proposal conceptualization and writing, host and co-supervisor of fellow

## Organization of Scientific Events

- Meier, C., Durville, D., Bröls, O., Gerstmayr, J., Linn, J.: Modeling and discretization approaches for slender continua and their interaction, Organization of minisymposium at the 6th European Conference on Computational Mechanics (ECCM), Glasgow, UK, 2018
- Eisenträger, J., Kaiser, T., Meier, C.: Organization of the YAMM (Young Academics Meet Mentors) Lunch at the 90th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Vienna, Austria, 2019
- Meier, C., Romero, I., Linn, J., Durville, D., Gerstmayr, Zupan, D., Betsch, P.: Advances in the modeling and discretization of slender continua and their interaction, Organization of minisymposium at the 14th World Congress on Computational Mechanics (WCCM), Paris, France, 2020 [shifted to digital version in 2021 due to COVID-19 pandemic]
- Meier, C., Hodge, N., Chiumenti, M., Wall, W.A.: Modeling and simulation approaches in metal additive manufacturing, Organization of minisymposium at the 14th World Congress on Computational Mechanics (WCCM), Paris, France, 2021
- Meier<sup>+</sup>, C., Hart<sup>+</sup>, A.J., Colosimo<sup>+</sup>, B.M., Eckert<sup>+</sup>, J., Gusarov<sup>+</sup>, A., Hodge<sup>+</sup>, N.: Metal additive manufacturing: fundamentals, modeling, materials, and implementation, CISM advanced course at the International Centre for Mechanical Science (CISM), Udine, Italy, 2021  
<sup>+</sup>main organizers, <sup>+</sup>lecturers
- Romero, I., Meier, C., Linn, J., Oesterle, B.: New numerical methods for slender bodies and their interactions, Organization of minisymposium at the 15th World Congress on Computational Mechanics (WCCM), Yokohama, Japan, 2022
- Meier, C., Chiumenti, M., Hodge, N., Cervera, M., Wall, W.A.: Modeling and simulation approaches of metal additive manufacturing on part scale, Organization of minisymposium at the 15th World Congress on Computational Mechanics (WCCM), Yokohama, Japan, 2022
- Meier, C., Kollmannsberger, S., Bartel, T., Auricchio, F.: Modeling and simulation of metal additive manufacturing processes, Organization of minisymposium at the 9th GACM Colloquium on Computational Mechanics (GACM), Essen, Germany, 2022
- Meier, C., Wudy, K., Bartel, T., Menzel, A., Chiumenti, M., Hodge, N.: Simulation and experimental validation of metal additive manufacturing processes on part-scale, Organization of invited session at the 4th International Conference on Simulation for Additive Manufacturing (Sim-Am), Munich, Germany, scheduled for 2023

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**Reviewing Activities for International Journals**

- Acta Mechanica
- Additive Manufacturing
- Applied Mathematical Modelling
- Applied Physics A
- Archive of Applied Mechanics
- Computers and Structures
- Computational Mechanics
- Computer Methods in Applied Mechanics and Engineering
- GAMM-Mitteilungen
- Granular Matter
- Integrating Materials and Manufacturing Innovation
- International Journal for Numerical Methods in Engineering
- International Journal of Non-Linear Mechanics
- International Journal of Solids and Structures
- Journal of Theoretical, Computational and Applied Mechanics
- Mechanics Based Design of Structures and Machines
- Mechanical Sciences
- Metals
- Multibody System Dynamics
- Powder Technology
- Progress in Additive Manufacturing
- Zeitschrift für Angewandte Mathematik und Mechanik

**Reviewing Activities for Research Agencies**

- European Union: Marie Skłodowska-Curie COFUND doctoral programs
- European Research Council (ERC): ERC Consolidator Grant
- Czech Science Foundation (CSF)

Teaching

### Teaching Experience as Lecturer

- *Physics-Based Modeling and Simulation of Metal Additive Manufacturing*, lecture, M.Sc.  
Department of Mechanical Engineering, TUM,  
winter term 2021/22<sup>+</sup><sup>^</sup>
- *Nonlinear Continuum Mechanics*, lecture, M.Sc.  
Department of Mechanical Engineering, TUM  
winter term 2021/22  
winter term 2020/21  
winter term 2019/20  
winter term 2018/19
- *Computational Solid and Fluid Dynamics*, lecture, B.Sc.  
Munich School of Engineering (MSE), TUM  
winter term 2020/21<sup>+</sup>  
winter term 2019/20<sup>+</sup>  
winter term 2018/19<sup>+</sup>
- *Research Topics in Computational Mechanics – Additive Manufacturing*, lecture, M.Sc.  
Department of Mechanical Engineering, TUM  
winter term 2020/21<sup>^</sup>  
winter term 2019/20
- *Nonlinear Finite Element Methods*, lecture, M.Sc.  
Department of Mechanical Engineering, TUM  
summer term 2022  
summer term 2021  
summer term 2020  
summer term 2019 - selected chapters (with W.A. Wall)  
summer term 2018 - selected chapters (with W.A. Wall)
- *Engineering Mechanics 1 – Statics*, lecture, B.Sc.  
Department of Mechanical Engineering, TUM  
winter term 2018/19\* – selected chapters (with W.A. Wall)
- *Engineering Mechanics 2 – Elastostatics*, lecture, B.Sc.  
Department of Mechanical Engineering, TUM  
summer term 2019\* – selected chapters (with W.A. Wall)
- *Engineering Mechanics 3 – Dynamics*, exercises and tutorials, B.Sc.  
Department of Mechanical Engineering, TUM  
winter term 2011/12\*
- *Engineering Mechanics 2 – Elastostatics*, exercises and tutorials, B.Sc.  
Department of Mechanical Engineering, TUM  
summer term 2011\*
- *Engineering Mechanics 1 – Statics*, exercises and tutorials, B.Sc.  
Department of Mechanical Engineering, TUM  
winter term 2010/11\*

\*Attended by up to 1000 undergraduate students

<sup>+</sup>English lecture

<sup>^</sup>joint lecture for students from TUM, MIT and Polimi

### Invitation as Guest Lecturer

- Summer school in Computational Mechanics of Materials and Structures, lecture, M.Sc.  
COMMAS program, University of Stuttgart, 2019
- *Additive Manufacturing: From 3D Printing to the factory floor*, short course, M.Sc.  
MIT, 2018 and 2017



### **Supervised Ph.D. Students (accountable supervision)**

- Experimental and model-based characterization of AM processes on the mesoscale (Reimar Weissbach, Mechanosynthesis Group, MIT, since 2020)
- Microstructure modeling and microstructure-informed material laws for metal AM (Nils Much, Institute for Computational Mechanics, TUM, since 2020)
- Modeling of cohesive powders and coupled fluid-powder dynamics in AM (Patrick Praegla, TUM, since 2020)
- Melt pool modeling for metal AM based on smoothed particle hydrodynamics (Yushen Sun, TUM, since 2019)
- Material laws and self-contact modeling in the complex swelling process of foams (Abhiroop Satheesh, TUM, since 2018)
- Model order reduction for thermo-mechanical part-scale simulation of AM processes (Sebastian Pröll, TUM, since 2018)
- Elasto-hydrodynamic lubrication coupled to mortar formulations for frictional contact (Mostafa Faraji, TUM, since 2018)
- Two-phase flow and coupled fluid-powder dynamics based on SPH (Sebastian Fuchs, TUM, 2016 - 2021)
- Molecular interactions of slender beams in complex biophysical systems (Maximilian Grill, TUM, 2014 - 2020)

### **Mentoring of Ph.D. Students in TUM Graduate School**

- Abhiroop Satheesh, Institute for Computational Mechanics, TUM
- Sebastian Pröll, Institute for Computational Mechanics, TUM
- Nils Much, Institute for Computational Mechanics, TUM
- Stefan Sinzig, Institute for Computational Mechanics, TUM
- Yushen Sun, Institute for Computational Mechanics, TUM
- Harald Willmann, Institute for Computational Mechanics, TUM
- Mostafa Faraji, Institute for Computational Mechanics, TUM
- Barbara Wirthl, Institute for Computational Mechanics, TUM
- Amadeus Gebauer, Institute for Computational Mechanics, TUM

### **Supervised B.Sc. Students and M.Sc. Students**

- Efficient simulation of additive manufacturing processes with parallel-in-time time integration using equivalent heat sources (Fazıl Necioğlu, TUM, 2021)
- Modeling the elasto-plastic deformation of aortic stents based on the geometrically exact beam finite elements (Lea Häusel, TUM, 2021)
- Mesoscale modeling of muscle bundles based on the finite element method and the geometrically exact beam theory with deformable cross-sections (Bugrahan Temür, TUM, 2021)
- Development of a microstructure-informed elasto-plastic constitutive law for metal melting and solidification processes (Nils Much, TUM, 2020)
- Enriched finite element solution spaces for the temperature field in metal additive manufacturing process simulation (Matthias Schäffer, TUM, 2020)

- Advanced powder spreading simulations for metal additive manufacturing using the discrete element method (Patrick Praegla, TUM / MIT, 2020)
- Modelling Marangoni effects through weakly compressible smoothed particle hydrodynamics (Lennart Schulze, TUM, 2019)
- Modeling the motion of rigid bodies in fluid flows using smoothed particle hydrodynamics (Bugrahan Temür, TUM, 2019)
- Thermo-mechanical material models for the prediction of residual stresses in additive manufacturing process simulation (Maximilian Ludwig, TUM, 2019)
- Mixing behavior of cohesive metal powders modeled via the discrete element method (Andreas Unterrainer, TUM, 2019)
- *Experimental characterization of cohesive metal powders for additive manufacturing applications* (Marvin Ochsenius, TUM / MIT, 2019)
- *Novel finite element formulations and numerical algorithms for an efficient thermo-mechanical simulation of selective laser melting processes* (Sebastian Pröll, TUM, 2018)
- *Development of advanced powder models for metal additive manufacturing processes based on the discrete element method* (Marvin Ochsenius, TUM, 2018)
- *Modeling and simulation of the powder spreading process in metal additive manufacturing processes* (Reimar Weissbach, TUM / MIT, 2017)
- *Development of a finite element method for short-range potential-based interactions of thin fibers* (Reimar Weissbach, TUM, 2015)
- *Investigation and comparison of different Kirchhoff beam formulations with weak / strong constraint enforcement* (Sleiman Haddar, TUM, 2015)
- *Development of a FEM beam-to-solid contact formulation* (Michael Hofer, TUM, 2014)
- *Development of a finite element formulation for potential-based interactions of slender continua and its application to biopolymers* (Maximilian Grill, TUM, 2014)
- *Implementation of a nonlinear 3D beam contact formulation based on the finite element method* (Daniel Neumann, TUM, 2013)
- *Development and Evaluation of Contact Formulations for Slender Structures* (Anja Bestler, TUM, 2013)
- *Theoretical analysis and finite element implementation of different geometrically nonlinear Euler-Bernoulli beam formulations* (Dominik Suckart, TUM, 2012)
- *Nonlinear 3D finite element formulation for beam contact based on Lagrange multipliers* (Chong Wang, TUM, 2012)
- *Visualization of smooth beam geometries and beam contact using splines* (Max von Danwitz, TUM, 2012)
- *Comparison of shape functions for a nonlinear Euler-Bernoulli beam element for the isotropic case* (Maximilian Grill, TUM, 2011)
- *Investigations on different reference triads for a nonlinear, anisotropic Euler-Bernoulli beam element* (Wolfgang Hering, TUM, 2011)