# Dr. Andreas Zwölfer | Curriculum Vitae

Techn. Univ. of Munich | Boltzmannstr. 15, 85748 Garching, DE | andreas.zwoelfer@tum.de

## CV HIGHLIGHTS:

- *Work experience*
  - Visiting Professor at Boeing, Washington, USA
  - Principal scientist and lecturer in engineering dynamics at the Technical University Munich, Germany – the European Union's best university
  - Assistant professor in mechanical engineering at the University of Innsbruck, Austria
  - Research assistant in vehicle dynamics at the Joanneum University Graz, Austria
  - Adjunct professor in Italy and Austria
  - Aerodynamics and structural analysis engineer at Joanneum Racing Graz, Austria
  - 6 years of industry experience as an automotive technician in Austria
- *Education*
  - PhD in Engineering Sciences from the University of Innsbruck, Austria
  - MSc in Advanced Mechanical Engineering from Imperial College London, UK
  - BSc in Automotive Engineering from the Joanneum University Graz, Austria
  - Master craftsman (MSt.) in Automotive Technology including management training from the Austrian Economic Chamber
  - 3 international summer schools
- *Publications*
  - 21 peer-reviewed full paper publications
  - 11 other scientific publications
  - 3 theses
- *Presentations*
  - 6 invited
  - 12 contributed
- *University teaching experience*
  - 5 Bachelor's courses
  - 4 Master's courses
  - 25 classes in total
- *Supervised theses*
  - 6 Bachelor's theses
  - 5 Master's theses
  - 4 PhD theses (ongoing)
- *Other scientific/academic activities*
  - Member of ASME's Technical Committee on Multibody Systems and Nonlinear Dynamics and of the Scientific Committee of the International Symposium on Industrial Engineering and Automation
  - Reviewer for Multibody System Dynamics, Journal of Computational and Nonlinear Dynamics, International Journal for Numerical Methods in Engineering, Mechanics Based Design of Structures and Machines, Archive of Applied Mechanics
  - Chairman at 4 conferences
  - Organizer of 6 conference symposiums
  - Organizer of one conference
  - Guest editor for Mechanics-Based Design of Structures and Machines
  - Moderator of NSF round-table discussion
  - Judge for one Best Paper Award
  - Reviewer and public examination opponent for one PhD thesis

## WORK EXPERIENCE:

*2024 - present* Visiting Professor at Boeing, Washington, USA

- Immersed in Boeing's research and development environment
- Infusing industry views into university work
- Exposing Boeing to ground-breaking research and future trends

*2020 - present* Principal scientist/lecturer in engineering dynamics at the Technical University Munich, Chair of Applied Mechanics, Germany

- Delivering lectures to bachelor and master students
- Supervising bachelor, master, and doctoral theses
- Technical leader of the engineering dynamics research group
- Research focusing on nonlinear structural dynamics, nonlinear model order reduction, finite element methods in dynamics, contact dynamics, data-driven dynamics and reduction
- Member of the management team
- Acquiring and managing a research budget of on average 1 million EUR per year (DFG, TUM, EU, BMW, Boeing, Zeiss, Bosch, Hilti, Siemens, etc.)

*2022* Adjunct professor in robotics and simulation at the University of Innsbruck, Austria

- Delivering lectures to master students

*2019 - 2021* Adjunct professor in structural mechanics at the Free University of Bozen-Bolzano, Italy

- Delivering lectures and exercises to bachelor students

*2017 - 2020* Assistant professor in mechanical engineering at the University of Innsbruck, Department of Mechatronics, Austria

- Delivering lectures and exercises to bachelor and master students
- Supervising bachelor and master theses
- Research focusing on flexible multibody system dynamics
- Execution of industry-funded (Leitner, Stihl) research projects

*2018 - 2019* Adjunct lecturer in mathematics at the professional qualification school WIFI Tirol, Austria

- Delivering lectures and exercises to mechatronics technicians to prepare them for their master craftsmanship exam

*2016* Research assistant in vehicle dynamics at the Joanneum University of Applied Sciences Graz, Austria

- Execution of a research project on the derivation, simulation, and investigation (vehicle dynamics and bearing loads) of an elastically-supported KERS attached to a vehicle chassis during standardized driving maneuvers

*2012 - 2013* Master automotive mechanic and workshop leader at Autocenter Arbing, Austria

- Workshop leader, error diagnostics, powertrain maintenance, costumer consulting

*2011 - 2012* Automotive diagnostic technician at MB Cars Mauer, Austria

- Error diagnostics, powertrain maintenance

*2010 - 2011* Military engineer in Melk, Austria

- Maintenance of the military vehicle fleet

*2007 - 2010* Apprentice as an automotive mechanic at Lietz Ltd. Hausmening, Austria

- Maintenance of passenger cars and motorcycles

## EDUCATION:

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| *2017 - 2020* | University of Innsbruck, Austria: Ph.D. (distinction) in Engineering Sciences<br>• Thesis: "Nodal-based corotational formulations for flexible multibody dynamics: Consistent, inertia-shape-integral-free modally-reduced equations of motion"<br>• Advisor: Prof. Johannes Gerstmayr |
| *2016 - 2017* | Imperial College London, United Kingdom: M.Sc. (distinction) in Advanced Mechanical Engineering<br>• Thesis: "Dynamic behavior optimization of non-linear lap joints"<br>• Advisor: Dr. Christoph Schwingshackl |
| *2013 - 2016* | Joanneum University of Applied Sciences Graz, Austria: B.Sc. (distinction) in Automotive Engineering<br>• Thesis: "Derivation, investigation, and application of an elastically supported gyrostat-model attached to a vehicle chassis"<br>• Advisor: Prof. Günter Bischof |
| *2012 - 2013* | High school WIFI Sankt Pölten, Austria: qualification for university entrance |
| *2011 - 2012* | Professional qualification school WIFI Sankt Pölten, Austria: Master craftsman (Meister – MSt.) in Automotive Technology (including management training) awarded by the Austrian Economic Chamber |
| *2007 - 2010* | Vocational school LBS Eggenburg, Austria: apprenticeship as an mechanic |

## ADDITIONAL TRAINING:

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| *2021* | Technical University of Munich, Germany: summer school on "Frequency Based Substructuring and Transfer Path Analysis" |
| *2019* | University of Innsbruck, Austria: winter school on "Robotics, multibody systems, and control" |
| *2018* | International center for mechanical sciences (CISM) Udine, Italy: summer school on "Substructuring in engineering dynamics: emerging numerical and experimental techniques" |

## REFERENCES:

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|---|---|
| *Prof. D. J. Rixen* | Full Professor of Applied Mechanics, Technical University of Munich, Germany: rixen@tum.de |
| *Prof. J. Gerstmayr* | Full Professor of Multibody System Dynamics, University of Innsbruck, Austria: johannes.gerstmayr@uibk.ac.at |
| *Prof. A. Mikkola* | Full Professor of Virtual Design, Lappeenranta-Lahti University of Technology, Finland: aki.mikkola@lut.fi |
| *Prof. G. Bischof* | Associate Professor of Mathematics, Joanneum University of Applied Sciences Graz, Austria: guenter.bischof@fh-joanneum.at |
| *Dr. E. Wehrle* | Senior Research Manager, Collins Aerospace – An RTX Business: erich.wehrle@collins.com |

**JOURNAL ARTICLES:**

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|---|---|
| *2023* | Slimak, T., Zwölfer, A., Todorov, B., Rixen, D.: "Using Machine Learning to Simulate Flexible Body Dynamics". Multibody System Dynamics, submitted |
| *2023* | Slimak, T., Zwölfer, A., Todorov, B., Rixen, D.: "Overview of Design Considerations for Data-Driven Time Stepping Schemes Applied to Non-Linear Mechanical Systems". Journal of Computational and Nonlinear Dynamics, submitted |
| *2023* | Huber, X., Zwölfer, A., Caillaud, B.: "Design Optimization of a Snowboard Performing an Ollie". Sports Engineering, submitted |
| *2023* | Zwölfer, A., Gerstmayr, J.: "A unified framework for corotational flexible multibody system dynamics formulations". Journal of Structural Dynamics **2**, 51-81 |
| *2023* | Martins, T., Trainotti, F., Zwölfer, A., Afonso, F.: "A Robust Python Implementation of Multi-harmonic Balance with Numerical Continuation and Automatic Differentiation for Structural Dynamics". Journal of Computational and Nonlinear Dynamics **18**(7), 071008 |
| *2023* | Zwölfer, A., Gerstmayr, J.: "Absolute coordinate formulation and generalized component mode synthesis with rigid body coordinates". Multibody System Dynamics **57**, 327–342 |
| *2023* | Yu, X., Zwölfer, A., Mikkola, A.: "An efficient, floating-frame-of-reference-based recursive formulation to model planar flexible multibody applications". Journal of Sound and Vibration **547**, 117542 |
| *2022* | Gufler, V., Zwölfer, A., Wehrle, E.: "Analytical derivatives of flexible multibody dynamics with the floating frame of reference formulation". Multibody System Dynamics, online first |
| *2021* | Gufler, V., Wehrle, E., Zwölfer, A.: "A review of flexible multibody dynamics for gradient-based design optimization". Multibody System Dynamics **53**, 379-409 |
| *2021* | Zwölfer, A., Gerstmayr, J.: "The nodal-based floating frame of reference formulation with modal reduction: How to calculate the invariants without a lumped mass approximation". Acta Mechanica **232**, 835-851 |
| *2020* | Zwölfer, A., Gerstmayr, J.: "A concise nodal-based derivation of the floating frame of reference formulation for displacement-based solid finite elements: Avoiding inertia shape integrals". Multibody System Dynamics **49**, 291-313 |
| *2019* | Zwölfer, A., Gerstmayr, J.: "Co-rotational formulations for 3D flexible multibody systems: A nodal-based approach". In: Altenbach, H., Irschik, H., Matveenko, V. (eds.), Contributions to Advanced Dynamics and Continuum Mechanics. Advanced Structured Materials, vol. 114. Springer, Cham |
| *2019* | Zwölfer, A., Gerstmayr, J.: "Preconditioning strategies for linear dependent generalized component modes in 3D flexible multibody dynamics". Multibody System Dynamics **47**(1), 65-93 |
| *2019* | Zwölfer, A., Bischof, G.: "Modelling and analysis of a gyrostat elastically attached to a vehicle". Vehicle System Dynamics **57**(6), 815-840 |

## SELECTED PEER-REVIEWED FULL-PAPER PROCEEDINGS:

*2023* Slimak, T., Zwölfer, A., Todorov, B., Rixen, D.: "Overview of Design Considerations for Data-Driven Time Stepping Schemes Applied to Non-Linear Mechanical Systems". In: Proceedings of the ASME 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. 19th International Conference on Multibody Systems, Nonlinear Dynamics, and Control. Boston, MA, USA

*2023* Gufler, V., Wehrle, E.,Zwölfer, A.: "Direct differentiation of the floating frame of reference formulation via invariants for gradient-based design optimization". In: Nachbagauer, K., Held, A. (eds.), Optimal Design and Control of Multibody Systems. Proceedings of the International Union of Theoretical and Applied Mechanics (UTAM) Symposium, vol. 42. Springer, Cham

*2020* Zwölfer, A., Gerstmayr, J.: "Consistent and inertia-shape-integral-free invariants of the floating frame of reference formulation". In: Proceedings of the ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. 16th International Conference on Multibody Systems, Nonlinear Dynamics, and Control. St. Louis, MO, USA

*2018* Zwölfer, A., Bischof, G.: "Bearing loads of elastically supported flywheels in vehicular application". SAE Technical Paper 2018-01-0826

*2018* Zwölfer, A., Gerstmayr, J.: "Selection of generalized component modes for modally reduced flexible multibody systems". In: Proceedings of the 5th International Conference on Multibody System Dynamics, Lisbon, Portugal

*2017* Gerstmayr, J., Zwölfer, A.: "Pros and cons of beams modelled with the absolute nodal coordinate formulation". In: Proceedings of the 7th Symposium on Mechanics of Slender Structures (MOSS), Mérida, Spain

*2015* Bischof, G., Zwölfer, A., Rubeša, D.: "Correlation between engineering students' performance in mathematics and academic success". In: Proceedings of the 122nd American Society for Engineering Education Annual Conference & Exposition, Seattle, Washington

## INVITED PRESENTATIONS:

*2022* Zwölfer, A.: "Data-Driven Dynamics and Reduction of Mechanical Systems", held virtually for the Simulation Based Engineering Lab of the Department of Mechanical Engineering of the University of Wisconsin-Madison, USA

*2021* Zwölfer, A.: "Numerical methods", keynote held at the Internal Conference of the Chair of Applied Mechanics of the Technical University of Munich

*2019* Zwölfer, A., Gerstmayr, J.: "A common and improved framework for flexible multibody formulations: A nodal-based approach", held at the Institute of Applied Mechanics of the Technical University of Munich, Germany

*2019* Zwölfer, A., Gerstmayr, J.: "Improved flexible multibody formulations", held at the Institute of Automotive Engineering of the Joanneum University of Applied Sciences Graz, Austria

*2020* Gerstmayr, J., Zwölfer, A.: "Nodal-based floating frame of reference formulation for flexible multibody systems", held at the Winter school in multibody dynamics organized by the University of Innsbruck, Lienz, Austria

*2018* Zwölfer, A., Gerstmayr, J.: "Synthesis of local and global formulations for flexible multibody systems", held at the Annual Meeting of the Austrian National Committee for Theoretical and Applied Mechanics, Vienna, Austria

## SELECTED EXTENDED ABSTRACTS:

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| *2024* | Zwölfer, A., Aubel, M., Rixen, D.: "A Model Reduction Strategy for Structures Subjected to Large Deformations and Large Rigid Body Motion". Abstract submitted to of the 7th International Conference on Multibody System Dynamics, Madison WI, USA |
| *2024* | Slimak, T., Zwölfer, A., Rixen, D.: "Combining Machine Learning Based Mechanical System Models with Time Integration Schemes". Abstract submitted to of the 7th International Conference on Multibody System Dynamics, Madison WI, USA |
| *2023* | Gerstmayr, J., Holzinger, S., Zwölfer, A.: "From 3D solid finite elements to reduced flexible multibody bodies with constraint interfaces: a holistic approach". In: Proceedings of the ASME 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. 19th International Conference on Multibody Systems, Nonlinear Dynamics, and Control. Boston, MA, USA |
| *2023* | Slimak, T., Zwölfer, A., Trainotti, F., Rixen, D.: "Sparse Identification of Unknown Equation of Motion Terms Associated with Complex Joint Phenomena in Multibody System Dynamics". In: Book of Abstracts of the ECCOMAS Thematic Conference on Multibody Dynamics, Lisbon, Portugal |
| *2022* | Zwölfer, A., Gerstmayr, J.: "A Unified Framework for Linearly-Elastic Flexible Multibody System Dynamics Formulations". In: Book of Abstracts of the 6th Joint International Conference on Multibody System Dynamics and The 10th Asian Conference on Multibody System Dynamics, New Delhi, India |
| *2022* | Gufler, V., Zwölfer, A., Wehrle, E.: "Direct differentiation of the floating frame of reference formulation for gradient-based design optimization". In: Book of Abstracts of the International Union of Theoretical and Applied Mechanics (UTAM) Symposium on Optimal Design and Control of Multibody Systems, Hamburg, Germany |
| *2021* | Zwölfer, A., Gerstmayr, J.: "An improved absolute coordinate formulation (ACF) for flexible multibody dynamics". In: Book of Abstracts of the ECCOMAS Thematic Conference on Multibody Dynamics, Online |
| *2019* | Zwölfer, A., Gerstmayr, J.: "Inertia-shape-integral-free derivation of the floating frame of reference formulation". In: Book of Abstracts of the ECCOMAS Thematic Conference on Multibody Dynamics, Duisburg, Germany |

## OTHER PUBLICATIONS

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| *2023* | Zwölfer, A., Trainotti, F., Westphal, J., Rixen, D.: "Rotordynamics Continuum Finite Element Formulations From A Structural and Multibody Dynamics Perspective." Conference Proceedings of the Society for Experimental Mechanics Series. Springer, Cham, submitted |
| *2023* | Gerstmayr, J., Zwölfer, A.: "ObjectFFRFreducedOrder". In: EXUDYN User Documentation, Available: https://exudyn.readthedocs.io/en/latest/ |
| *2023* | Gerstmayr, J., Zwölfer, A.: "ObjectFFRF". In: EXUDYN User Documentation, Available: https://exudyn.readthedocs.io/en/latest/ |

## PHD EXAMINATIONS AND OTHER AWARD JUDGE ACTIVITIES:

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| *2022* | Judge for the Best Paper Award on Multibody Dynamics of ASME's 18th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC) |
| *2021* | Khadim, Q.: "Multibody system dynamics driven product processes", PhD thesis, Lappeenranta-Lahti University of Technology (thesis reviewer and public examination opponent) |

## HONOUR & AWARD:

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| *2016* | Highest award of the Austrian Automotive Industry University of Applied Sciences Competition 2016: award from the Industrial Association of the Austrian Automotive Industry for my bachelor's thesis "Derivation, investigation and application of an elastically supported gyrostat-model attached to a vehicle chassis", conducted at the Joanneum University of Applied Sciences Graz, Austria |

## CHAIRMAN/ORGANIZER, EDITORIAL AND OTHER SCIENTIFIC ACTIVITIES:

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| *2024* | Co-guest editor of Mechanics-Based Design of Structures and Machines' special issue on Data-Driven Methods for Multibody System Dynamics |
| *2024* | Co-chair of ASME's 20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Washington, DC, USA |
| *2024* | Organizer of the Symposium on Flexible Multibody Dynamics at ASME's 20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Washington, DC, USA |
| *2024* | Organizer of the Symposium on Data-Driven & Machine Learning-based Applications at the 7th International Conference on Multibody System Dynamics, Madison, WI, USA |
| *2024* | Organizer of the Special Track on Formulations and Applications of Structural and Multibody Dynamics at the 3rd International Symposium on Industrial Engineering and Automation – Latest Advancements In Mechanical Engineering, Bozen-Bolzano, Italy |
| *2023* | Moderator of round-table discussion on Hot Topics in Mechanical System Dynamics together with NSF program officers at ASME's 19th International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Boston, MA, USA |
| *2023* | Organizer and chairman of the Symposium on Flexible Multibody Dynamics at the ASME's 19th International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Boston, MA, USA |
| *2022* | Organizer of the Symposium on Flexible Multibody Dynamics at ASME's 18th International Conference on Multibody Systems, Nonlinear Dynamics, and Control, St. Louis, MO, USA |
| *2021* | Chairman of the 3rd Flexible Multibody Dynamics session at the ECCOMAS Multibody Dynamics Online Conference |
| *2021* | Chairman and organizer of the Symposium on Flexible Multibody Dynamics at ASME's 17th International Online Conference on Multibody Systems, Nonlinear Dynamics, and Control |
| *2020* | Chairman at the Online Symposium on Flexible Multibody System Dynamics, University of Innsbruck, Austria |

**SELECTED CONTRIBUTED PRESENTATIONS:**

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|---|---|
| *2023* | Gerstmayr, J., Holzinger, S., Zwölfer, A.: "From 3D solid finite elements to reduced flexible multibody bodies with constraint interfaces: a holistic approach", held at the ASME 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. 19th International Conference on Multibody Systems, Nonlinear Dynamics, and Control. Boston, MA, USA |
| *2023* | Slimak, T., Zwölfer, A., Todorov, B., Rixen, D.: "Overview of Design Considerations for Data-Driven Time Stepping Schemes Applied to Non-Linear Mechanical Systems", held at the ASME 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. 19th International Conference on Multibody Systems, Nonlinear Dynamics, and Control. Boston, MA, USA |
| *2023* | Slimak, T., Zwölfer, A., Trainotti, F., Rixen, D.: "Sparse Identification of Unknown Equation of Motion Terms Associated with Complex Joint Phenomena in Multibody System Dynamics", held at the ECCOMAS Thematic Conference on Multibody Dynamics, Lisbon, Portugal |
| *2022* | Zwölfer, A., Gerstmayr, J.: "A Unified Framework for Linearly-Elastic Flexible Multibody System Dynamics Formulations", held virtually at the 6th Joint International Conference on Multibody System Dynamics (IMSD) and 10th Asian Conference on Multibody Dynamics (ACMD), New Delhi, India |
| *2022* | Gufler, V., Zwölfer, A., Wehrle, E.: "Direct differentiation of the floating frame of reference formulation for gradient-based design optimization", held at the International Union of Theoretical and Applied Mechanics (UTAM) Symposium on Optimal Design and Control of Multibody Systems, Hamburg, Germany |
| *2021* | Zwölfer, A., Gerstmayr, J.: "An improved absolute coordinate formulation (ACF) for flexible multibody dynamics", held at the ECCOMAS Multibody Dynamics Online Conference |
| *2020* | Zwölfer, A., Gerstmayr, J.: "Consistent and inertia-shape-integral-free invariants of the floating frame of reference formulation", held at the ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. 16th International Conference on Multibody Systems, Nonlinear Dynamics, and Control. St. Louis, MO, USA |
| *2020* | Zwölfer, A., Gerstmayr, J.: "A matrix-based and implementation-friendly variant of the floating frame of reference formulation", held at the Online Symposium on Flexible Multibody System Dynamics |
| *2020* | Zwölfer, A.: "Nodal-based corotational formulations for flexible multibody dynamics", held at the University of Innsbruck, Austria (Ph.D. viva) |
| *2019* | Zwölfer, A., Gerstmayr, J.: "Inertia-shape-integral-free derivation of the floating frame of reference formulation", held at the ECCOMAS Multibody Dynamics Conference, Duisburg, Germany |
| *2019* | Zwölfer, A., Gerstmayr, J.: "Nodal-displacement-based derivation of the floating frame of reference formulation: Avoiding inertia shape integrals", held at the 90th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Vienna, Austria |
| *2018* | Zwölfer, A., Gerstmayr, J.: "Selection of generalized component modes for modally reduced flexible multibody systems", held at the 5th Joint International Conference on Multibody System Dynamics (IMSD), Lisbon, Portugal |

| REVIEW ACTIVITIES (JOURNALS ONLY): | |
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| *2024* | 1 × Multibody System Dynamics, 1 × Archive of Applied Mechanics |
| *2023* | 4 × Multibody System Dynamics, 2 × Journal of Computational and Nonlinear Dynamics |
| *2022* | 2 × Journal of Computational and Nonlinear Dynamics, 1 × Multibody System Dynamics, 1 × International Journal for Numerical Methods in Engineering |
| *2021* | 1 × Journal of Computational and Nonlinear Dynamics, 1 × Multibody System Dynamics |
| *2020* | 2 × Multibody System Dynamics, 1 × Mechanics Based Design of Structures and Machines |
| *2019* | 1 × Multibody System Dynamics |

| EXCLUSIVE MEMBERSHIPS: | |
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| *since 2023* | Member of the ASME Technical Committee on Multibody Systems and Nonlinear Dynamics |
| *since 2023* | Member of the International Scientific Committee of the International Symposium on Industrial Engineering and Automation |

| SKILLS: | |
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| *Expertise* | nonlinear structural dynamics, nonlinear model order reduction, finite element methods in dynamics, contact dynamics, data-driven dynamics and reduction, flexible multibody system dynamics, nonlinear finite element analysis, CAE, vibroacoustics, strength of materials, experimental dynamics, vibration analysis, continuum mechanics, solid mechanics, NVH, joint dynamics, optimization, nonlinear dynamics, computational mechanics, modeling and simulation, numerical methods, machine dynamics, rotordynamics, data analysis, machine learning, powertrain technology, biomechanics, vehicle dynamics, substructuring, leadership |
| *IT literate* | Detailed proficiency using EXUDYN, ABAQUS, MATLAB/Simulink, Python, Simpack, Adams, ANSYS, RecurDyn, veDYNA, Simscape, and CATIA |
| *Languages* | At ease with presenting data and arguments to groups of people in either English (native-level proficiency) or German (native proficiency) |
| *Numeracy* | Special ability and passion for mathematics and in handling/interpreting information in tabular, graphic or equation form |
| *Practical skills* | I have been building and restoring vehicles since my early teenage years; I am also conversant in working with tools and machines, e.g., welding, turning, milling, et cetera |
| *Problem solving* | Fluent in using analytical methods for solving real-world problems; can-do attitude |
| *Writing* | Enjoy writing scientific papers and technical documentation; I am highly interested in disseminating scientific knowledge |
| *Driving licenses* | Car, motorcycle, heavy trailer |

## UNIVERSITY TEACHING EXPERIENCE:

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| *since 2023* | Bachelor's level course (5 ECTS) "Dynamic simulation for vehicles, machines, and mechanisms" held at the Technical University of Munich, Germany: kinematics and dynamics of rigid body systems, joints/drives/actuators, linearization, rotor dynamics, machinery vibration analysis, time integration, computer implementation |
| *since 2021* | Master's level course (3 ECTS) "Multibody Simulation" held at the Technical University of Munich, Germany: analytical dynamics, 3d kinematics and finite rotations, dynamics of rigid body systems, floating frame of reference formulation, time integration |
| *since 2020* | Master's level course (5 ECTS) "Engineering Dynamics" held at the Technical University of Munich, Germany: analytical dynamics, dynamics of rigid bodies, linear elstodynamics, dynamics of continuous systems, discretization |
| *2019 - 2021* | Bachelor's level course (6 ECTS) "Mechanics of Structures" held at the Free University of Bozen-Bolzano, Italy: statics of rigid bodies and systems, mechanics of materials (stress and strain, tension and compression, torsion, bending, energy methods, buckling) |
| *2019 - 2020* | Master's level course (4 ECTS) "VU Dynamics of Machinery" held at the University of Innsbruck, Austria: vibrations of multi-degree-of-freedom systems, rotordynamics, modal analysis, modal reduction, nonlinear vibrations |
| *2018 - 2020, 2022* | Master's level course (2.5 ECTS) "VU Industrial Mechatronics 2 – Advances: Robotics and Simulation" held at the University of Innsbruck, Austria: kinematics, multibody system dynamics, time integration of multibody systems, constraints, floating frame of reference formulation, simulation tutorials |
| *2018 - 2020* | Bachelor's level course (2.5 ECTS) "VU Multibody System Dynamics" held at the University of Innsbruck, Austria: linear vibrations, modal analysis, D'Alembert's principle, Lagrange's equations, dynamics of rigid bodies |
| *2018 - 2019* | Bachelor's level course (1.5 ECTS) "UE Machine Design" held at the University of Innsbruck, Austria: bearing loads, stress, failure, fatigue strength, strength-reducing influences, buckling, thermal stress, analysis of machine elements |
| *2017 - 2019* | Bachelor's level course (5 ECTS) "VU Mechanical Engineering and Construction Design" held at the University of Innsbruck, Austria: springs, bolted/adhesive/welded joints, design principles |

## VOLUNTEER EXPERIENCE:

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| *2015 - 2016* | Member of Joanneum Racing Graz's Formula Student team: aerodynamics and structural mechanics analysis |

## PUBLIC APPEARANCES:

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| *2021* | Interview by Werner Schandor from the Joanneum University of Applied Sciences Graz, Austria: alumni portrait published on the university's website online |

**SUPERVISED THESES:**

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|---|---|
| *ongoing* | Zobel, O.: "Advanced Model Reduction Techniques in Structural Dynamics", PhD thesis, Technical University of Munich, Germany |
| *ongoing* | Simoes Martins, T. M.: "Steady-State Solution Strategies for Nonlinear Structural Dynamics Systems", PhD thesis, Technical University of Munich, Germany |
| *ongoing* | Trainotti, F.: "Characterization and Modeling of Joints in Vibration Analysis", PhD thesis, Technical University of Munich, Germany |
| *ongoing* | Slimak, T.: "An Exploration of New Technologies to Enable Dynamic Motion of Humanoid Robots", PhD thesis, Technical University of Munich, Germany |
| *ongoing* | Huber, X.: "A Unified Approach to Structural and Multibody Dynamics Through the Lens of Continuum Mechanics", Master's thesis, Technical University of Munich, Germany |
| *2024* | Aubel, M.: "An efficient finite element structural dynmanics formulation for large displacement and deformation problems', Master's thesis, Technical University of Munich, Germany |
| *2023* | Westphal, J.: "On the evaluation and advance of rotordynamics simulations for finite element and multibody systems", Master's thesis, Technical University of Munich, Germany |
| *2023* | Huber, X.: "The dynamics of an ollie performed on a snowboard", Semester thesis, Technical University of Munich, Germany |
| *2022* | Oertel, C. C.: "Development of a test bed for multibody simulation validation, Bachelor's thesis, Technical University of Munich, Germany |
| *2022* | Todorov, B.: "Data-driven simulations of mechanical systems, Bachelor's thesis, Technical University of Munich, Germany |
| *2021* | Slimak, T.: "Towards digital twins through flexible multibody dynamics, Master's thesis, Technical University of Munich, Germany |
| *2020* | Klatzer, M, Müller, C.: "Investigation of the dynamics of an elastically supported gyrostat on a moving platform, Bachelor's thesis, Joanneum University of Applied Sciences Graz, Austria |
| *2019* | Trojer, S.: "Development of a force measuring hub" (translated from German: "Entwicklung einer Kraftmessnabe"), Bachelor's thesis, University of Innsbruck, Austria |
| *2018* | Ersoysal, S.: "Design and setup of a haptic display for touch screens" (translated from German: "Entwicklung und Aufbau eines haptischen Feedbacks für Touchdisplays"), Bachelor's thesis, University of Innsbruck, Austria |
| *2018* | Niederwanger, P.: "Design and setup of a gimballed mechatronic gyrostat" (translated from German: "Entwurf und Konstruktion eines mechatronischen Kreisels mit kardanischer Lagerung"), Bachelor's thesis, University of Innsbruck, Austria |

**FURTHER INTERESTS:**

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| *Travel* | I am especially keen to explore other cultures and foreign places. |
| *Fitness/Outdoor* | I believe great mental effort requires a strong healthy body, so I always challenge myself and try to push my own limits during my workouts and outdoor activities. |
| *Nutrition* | A well-balanced nutrition is one way to boost your performance. |
| *Education* | Inspiring my students, family, colleagues, and fellow humans is a pleasure for me. |
| *Books* | Leaders are readers. I deeply believe in continuous/lifelong self-improvement. |