Dr. Andreas Zwölfer | Curriculum Vitae

Technical University of Munich, Boltzmannstr. 15, 85748 Garching, DE | 0000-0002-5457-0012
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WORK EXPERIENCE:

2024 - 2025 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
- Establishing a global research network

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, data-driven dynamics and reduction, modeling and simulation
- Member of the management team
- Acquiring and managing a research budget of close to 1 million EUR per year (DFG, TUM, EU, BMW, Boeing, Zeiss, Bosch, Hilti, Siemens, Infineon, etc.)

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

- Delivering lectures to master students

2019 - 2021 Adjunct professor in structural mechanics at the 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 Trainer 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:

2024 - present	Technical University of Munich, Germany: Habilitation in Engineering Dynamics • Mentors: Prof. Daniel Rixen, Prof. Wolfgang Wall, Prof. Olivier Bauchau
2017 - 2020	University of Innsbruck, Austria: Ph.D. (distinction) in Engineering Sciences • Thesis: "Nodal-based corotational formulations for flexible multibody dynamics: Consistent, inertia-shape-integral-free modally-reduced equations of motion" • Advisor: Prof. Johannes Gerstmayr
2016 - 2017	Imperial College London, United Kingdom: M.Sc. (distinction) in Advanced Mechanical Engineering • Thesis: "Dynamic behavior optimization of non-linear lap joints" • Advisor: Dr. Christoph Schwingshackl
2013 - 2016	Joanneum University of Applied Sciences Graz, Austria: B.Sc. (distinction) in Automotive Engineering • Thesis: "Derivation, investigation, and application of an elastically supported gyrostat-model attached to a vehicle chassis" • 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:

2024	Technical University of Munich, Germany: "Certificate for Teaching in Higher Education of the Bavarian Universities"
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:

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:

2025	Zwölfer, A., Holzinger, S.: "Viscoelastic Modally-Reduced Nodal-Based Floating Frame of Reference Formulation", Multibody System Dynamics, submitted
2025	Antunes, A. M., Zwölfer, A., Verelst, D. R., Riva, R., Haselbach, P. U., Kim, T.: "Modelling large deflections through reduced-order multibody structures in the floating frame of reference formulation", Multibody System Dynamics, submitted
2025	Holzinger, S., Zwölfer, A., Trainotti, F., Gerstmayr, J.: "The Floating Frame of Reference Formulation for Rotordynamics Applications: Limitations and Practical Solutions", Multibody System Dynamics, submitted
2025	Zwölfer, A., Aubel, M., Páleník, R.: "Equivalence Between the Co-Rotational Finite Element Method and the Absolute Coordinate Formulation in Multibody Dynamics", International Journal for Numerical Methods in Engineering, submitted
2025	Østerby, J., Zwölfer, A., Santos, I.: "Nodal-Based Floating Frame of Reference Formulation Approaches in Large Bore Two-Stroke Diesel Engine Crankshaft Dynamics", Journal of the Brazilian Society of Mechanical Sciences and Engineering, submitted
2025	Zobel, O., Zwölfer, A., Weber, T., Rixen, D.:"Real-Time Simulation of Flexible Bodies with Ray-Traced Contact in the Unity Game Engine". Multibody System Dynamics, online first
2025	Zwölfer, A., Østerby, J., Santos, I.: "Rotordynamics Local Frame Formulations for Three-Dimensional Continuum Finite Elements". ASME Journal of Computational and Nonlinear Dynamics, **20**(12): 121001
2025	Slimak, T., Zwölfer, A., Todorov, B., Rixen, D.: "A Machine Learning Approach to Simulate Flexible Body Dynamics". Multibody System Dynamics **64**, 515-541
2024	Huber, X., Zwölfer, A., Caillaud, B.: "Design Optimization of a Snowboard Performing an Ollie". Sports Engineering **27**:28
2024	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 **19**(7), 071012
*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 Python Implementation of a Robust 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 **60**, 257-288
*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

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

OTHER PUBLICATIONS:

2024	Trainotti, F., Zwölfer, A., Westphal, J., Rixen, D.J.: “Rotordynamics Continuum Finite Element Formulations from a Structural and Multibody Dynamics Perspective.” In: Di Maio, D. (eds) Special Topics in Structural Dynamics & Experimental Techniques, Vol. 5. IMAC 2024. Conference Proceedings of the Society for Experimental Mechanics Series. Springer, Cham
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/

SELECTED EXTENDED ABSTRACTS:

2025	Slimak, T., Todorov, B., Zwölfer, A.: “Hybrid NN-EOM Approach to Accelerate Multi-body Simulations”. Submitted to the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria
2025	Zwölfer, A., Holzinger, S.: “Viscoelastic Modally-Reduced Nodal-Based Floating Frame of Reference Formulation”. Submitted to the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria
2025	Holzinger, S., Zwölfer, A., Trainotti, F., Gerstmayr, J.: “The Floating Frame of Reference Formulation for Rotordynamics Applications: Limitations and Practical Solutions”. Submitted to the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria
2025	Zobel, O., Zwölfer, A., Weber, T., Rixen, D.: “Real-Time Simulation of Flexible Bodies with Ray-Traced Contact in the Unity Game Engine”. Submitted to the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria
2024	Holzinger, S., Zwölfer, A., Rixen, D.J.: “Efficient Simulation of Soft Tissue for Human, Robotics, and Exoskeleton Applications.” IMAC 2025 Conference Proceedings of the Society for Experimental Mechanics, submitted
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

INVITED PRESENTATIONS:

2025	Zwölfer, A.: "Parametric Reduction in the Floating Frame of Reference Formulation for Flexible Multibody Systems with Changing Boundary Conditions", held at the Department of Mechanical Engineering of LUT University, Finland
2024	Zwölfer, A.: "Efficient Yet Accurate Modeling & Solution Techniques in Engineering Dynamics ", held at the Institute of Mechatronics of the University of Innsbruck, Austria
2024	Zwölfer, A.: "The nodal-based floating frame of reference formulation for flexible multibody system dynamics", held at the Department of Mechanical Engineering of LUT University, Finland
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 CONFERENCE PRESENTATIONS:

2025	Slimak, T., Todorov, B., Zwölfer, A.: "Hybrid NN-EOM Approach to Accelerate Multi-Body Simulations", held at the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria
2025	Zobel, O., Zwölfer, A., Weber, T., Rixen, D.: "Real-Time Simulation of Flexible Bodies with Ray-Traced Contact in the Unity Game Engine", held at the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria
2025	Zwölfer, A., Holzinger, S.: "Viscoelastic Modally-Reduced Nodal-Based Floating Frame of Reference Formulation", held at the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria

2025 Holzinger, S., Zwölfer, A., Trainotti, F., Gerstmayr, J.: "The Floating Frame of Reference Formulation for Rotordynamics Applications: Limitations and Practical Solutions", held at the ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria

2025 Holzinger, S., Zwölfer, A., Trainotti, F., Rixen, D.: "Incorporating Nonlinear Elastic Forces in the Nodal-Based Floating Frame of Reference Formulation", held at the 95th Annual Meeting of the International Assosication of Applied Mathematics and Mechanics, Poznan, Poland

2025 Zwölfer, A.: "Data-Driven Model Reduction for Flexible Multibody System Dynamics", held at the Symposium on Perspectives of Multibody Systems Towards Data-Based Methods and AI, Innsbruck, Austria

2025 Slimak, T., Todorov, B., Zwölfer, A.: "Leveraging Multiple Specialized Neural Networks to Improve Extrapolation of Mechanical System Dynamics", held at the 1st ECCOMAS Thematic Conference on Artificial Intelligence and Computational Methods in Applied Science (AICOMAS), Paris, France

2025 Zwölfer, A., Todorov, B., Slimak, T.: "Classical Time Integration Schemes for Mechanical Systems Modeled With Artificial Neural Networks", held at the 1st ECCOMAS Thematic Conference on Artificial Intelligence and Computational Methods in Applied Science (AICOMAS), Paris, France

2025 Holzinger, S., Zwölfer, A., Rixen, D.J.: "Efficient Simulation of Soft Tissue for Human, Robotics, and Exoskeleton Applications", held at the IMAC-XLIII Conference & Exposition (Lights, Camera, IMAC!), Orlando, FL, USA

2024 Zwölfer, A., Aubel, M., Rixen, D.: "A Model Reduction Strategy for Structures Subjected to Large Deformations and Large Rigid Body Motion", held at the ASME 2024 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. 20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Washington, DC, USA

2024 Trainotti, F., Zwölfer, A., Westphal, J., Rixen, D.J.: "Rotordynamics Continuum Finite Element Formulations from a Structural and Multibody Dynamics Perspective", held at the IMAC-XLII Conference & Exposition (Standing on the Shoulders of Giants), Orlando, FL, USA

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

CHAIRMAN/ORGANIZER, EDITORIAL AND OTHER SCIENTIFIC ACTIVITIES:

2025	Conference co-chair of ASME’s 21st International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Anaheim, CA, USA
2025	Co-organizer of the Symposium on Flexible Multibody Dynamics at ASME’s 21st International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Anaheim, CA, USA
2025	Member of the Organizing Committee of the 12th ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria.
2025	Co-organizer of the symposium on Formulations and Numerical Methods at the 12th ECCOMAS Thematic Conference on Multibody Dynamics, Innsbruck, Austria.
2025	Co-organizer and chairman of the symposium on Machine Learning and AI in Multibody System Dynamics at the 1st ECCOMAS Artificial Intelligence and Computational Methods in Applied Science (AICOMAS 2025), Paris, France

2025	Guest Editor for the Special Issue titled Multibody Dynamics in Springer's Multibody System Dynamics
since 2024	Associate Editor of ASME's Journal of Computational and Nonlinear Dynamics
2024 - 2025	Co-guest editor of Mechanics-Based Design of Structures and Machines' special issue on Data-Driven Methods for Multibody System Dynamics
2024	Program co-chair of ASME's 20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control, Washington, DC, USA
2024	Co-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	Co-organizer of the Symposium on Data-Driven & Machine Learning-based Applications at the 7th International Conference on Multibody System Dynamics, Madison, WI, USA
2024	Co-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	Co-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	Co-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	Co-organizer and chairman 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

HONOUR & AWARD:

2024	Conference Chair Award in recognition of outstanding service to the community as Conference Chair of the 21st International Conference on Multibody Systems, Nonlinear Dynamics, and Control
2024	Program Chair Award in recognition of outstanding service to the community as Program Chair of the 20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control
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

PHD EXAMINATIONS AND OTHER AWARD JUDGE ACTIVITIES:

2025	Judge for the Best Paper Award on Multibody Dynamics of ASME's 21st International Conference on Multibody Systems, Nonlinear Dynamics, and Control
2022	Member of the Student Paper Competition Committee of ASME's 21st International Conference on Multibody Systems, Nonlinear Dynamics, and Control
2022	Judge for the Best Paper Award on Multibody Dynamics of ASME's 18th International Conference on Multibody Systems, Nonlinear Dynamics, and Control
2021	Khadim, Q.: "Multibody system dynamics driven product processes", PhD thesis, Lappeenranta-Lahti University of Technology

REVIEW ACTIVITIES (JOURNALS ONLY):

2025	1 × Nonlinear Dynamics, 3 × Multibody System Dynamics , 3 × Mechanics Based Design of Structures and Machines, 1 × Journal of Computational and Nonlinear Dynamics
2024	1 × International Journal of Non-Linear Mechanics, 2 × Journal of Computational and Nonlinear Dynamics, 5 × Multibody System Dynamics, 1 × Archive of Applied Mechanics, 1 × Mechanics Based Design of Structures and Machines
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

MEMBERSHIPS:

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

UNIVERSITY TEACHING EXPERIENCE:

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

SUPERVISED THESES:

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	Shen, L.-Y.: "Decoupling Rigid Body Motion and Elastodynamics in Flexible Multibody Systems: A Comparative Study of Machine Learning and Classical Methods", Bachelor's thesis, Technical University of Munich, Germany
ongoing	Lin, L.: "A Geometrically Exact Rigid Multipoint Constraint Formulation", Bachelor's thesis, Technical University of Munich, Germany
ongoing	Sun, D.: "Fatigue Analysis of Multibody System Components", Master's thesis, Technical University of Munich, Germany
ongoing	Debian, A.: "Modeling and Simulation of Thermoelastic Effects in Flexible Multibody Systems", Semester thesis, Technical University of Munich, Germany

ongoing	Eisenmann, T.: “Koopman Operator Methods for Nonlinear Mechanical System Dynamics’, Semester thesis, Technical University of Munich, Germany
ongoing	Gajewski, I.: “Design Optimization of a Formula Student Monocoque Based on Dynamic Analysis with Emphasis on E-Component Vibrations and Suspension Mount Stresses”, Semester thesis, Technical University of Munich, Germany
2025	Sun, D.: “Modeling and Parameter Identification of Artificial Human Soft Tissue Subjected to Periodic Excitations”, Semester thesis, Technical University of Munich, Germany
2025	Thosar, A.: “Modal Reduction Techniques for the Viscoelastic Nodal-Based Floating Frame Formulation”, Master’s thesis, Technical University of Munich, Germany
2025	Chen, W.: “Online Trajectory Generation for Human-Robot Collaboration”, Semester thesis, Technical University of Munich, Germany
2025	Lommer, L.: “A Two-Stage Extension of Lie Group Generalized-Alpha for Constrained Multibody Systems”, Semester thesis, Technical University of Munich, Germany
2025	Ma, X.: “Higher-Order Implicit Runge-Kutta-Munthe-Kaas Methods for Constrained Multibody Systems”, Semester thesis, Technical University of Munich, Germany
2025	Zahlbaum, E.: “A Non-Intrusive Technique for Capturing Large Body-Level Deformations within the Floating Frame of Reference Formulation”, Semester thesis, Technical University of Munich, Germany
2025	Sucu, B. E.: “Investigation of Reduction Techniques for Structures Subjected to Large Deformations and Large Rigid Body Motions”, Master’s thesis, Technical University of Munich, Germany
2024	Auer, S.: “Sparse Identification of Non-Linear Joint Dynamics for Multibody Simulations”, Semester thesis, Technical University of Munich, Germany
2024	Bordin, G.: “On Rotordynamics from a structural and multibody dynamics perspective”, Semester thesis, Technical University of Munich, Germany
2024	Antunes, A.: Supervised guest PhD student from the Technical University of Denmark during their research exchange, with a focus on wind turbine dynamics
2024	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 dynamics 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	Østerby Rasmussen, J.: Supervised guest PhD student from the Technical University of Denmark during their research exchange, with a focus on marine engine dynamics
2023	Huber, X.: “The dynamics of an ollie performed on a snowboard”, Semester thesis, Technical University of Munich, Germany
2022	Gufler, V.: Supervised guest PhD student from the Technical University of Bozen-Bolzano during their research exchange, with a focus on the design optimization of flexible multibody dynamic systems

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

PROJECTS:

2025-2026 "Digital Anatomical Geometry Definition of Shoulder Complex and Related Anatomical Features"

- Funding organization: The Boeing Company
- Funding amount: 41 400 €
- Role: Principal investigator
- Acquired: Independently

2024-2025 "Analysis of mirror vibrations in galvanometer scanners"

- Funding organization: SCANLAB GmbH
- Funding amount: 65 700 €
- Role: Principal investigator
- Acquired: By Prof. Daniel Rixen

2024 "Analysis approaches and mitigation of stresses generated in glued joints of an assembly submitted to ultra-sonic excitations 3"

- Funding organization: Carl Zeiss SMT GmbH
- Funding amount: 98 000 €
- Role: Co-Principal investigator
- Acquired: Together with Prof. Daniel Rixen

2024 "Model Reduction and Nonlinear Dynamic Analysis of large deflection MEMS Devices"

- Funding organization: Infineon Technologies AG
- Volume: 65 300 €
- Acquired: By Prof. Daniel Rixen
- Role: Co-Principal investigator

2024 "Virtual Qualification: Experiments, Modeling and Simulation of Assembly Processes"

- Funding organization: Boeing Deutschland GmbH
- Volume: 200 100 €
- Acquired: Independently
- Role: Principal investigator

2023 "Simulation of Mechatronic Systems (Robot, Workpiece and Stabilization Unit) in Unity"

- Funding organization: Boeing Deutschland GmbH
- Volume: 215 050 €
- Acquired: Independently
- Role: Principal investigator

2023 "Analysis approaches and mitigation of stresses generated in glued joints of an assembly submitted to ultra-sonic excitations 2"

- Funding organization: Carl Zeiss SMT GmbH
- Funding amount: 115 000 €
- Role: Co-Principal investigator
- Acquired: Together with Prof. Daniel Rixen

2023 "Measurement and Characterization of Mechatronic Systems"

- Funding organization: Boeing Deutschland GmbH
- Volume: 79 994 €
- Role: Principal investigator
- Acquired: Independently

2023 "Harmonic Balance analysis for gear transmission NVH"

- Funding organization: Robert Bosch GmbH
- Funding amount: 14 500 €
- Role: Principal investigator
- Acquired: Independently

2023 "Konzeptentwicklung und Untersuchung von Methoden zur gleichzeitigen Drehgeschwindigkeitsmessung von mehreren Winkelschleifer-Komponenten"

- Funding organization: Hilti AG
- Funding amount: 9 000 €
- Role: Principal investigator
- Acquired: Independently

2022 "State-of-the-art and beyond model reduction techniques in structural dynamics"

- Funding organization: Robert Bosch GmbH
- Funding amount: 10 000 €
- Role: Principal investigator
- Acquired: Independently

2022 "Analysis approaches and mitigation of stresses generated in glued joints of an assembly submitted to ultra-sonic excitations 1"

- Funding organization: Carl Zeiss SMT GmbH
- Funding amount: 17 300 €
- Role: Co-Principal investigator
- Acquired: Together with Prof. Daniel Rixen

VOLUNTEER EXPERIENCE:

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

SKILLS:

Expertise / Keywords:	nonlinear structural dynamics, nonlinear model order reduction, nonlinear finite element methods in dynamics, contact/joint dynamics, data-driven dynamics, data-driven reduction, flexible multibody system dynamics, CAE, experimental dynamics, continuum mechanics, solid mechanics, NVH, optimization, nonlinear dynamics, computational dynamics, modeling and simulation, hybrid simulation, data analysis, machine learning, powertrain technology, biomechanics, vehicle dynamics, substructuring, robotics, multiphysics, artificial intelligence, large language models, engineering education
IT literate	Detailed proficiency using EXUDYN, ABAQUS, MATLAB/Simulink, Python, Simpack, Adams, ANSYS, RecurDyn, veDYNA, Simscape, CATIA, and Jira Confluence
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

FURTHER INTERESTS:

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.