

Majdi Gzal

July 01, 2025

PERSONAL DETAILS

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ACADEMIC DEGREES

02/2022	Doctor of Philosophy - PhD, <i>direct track</i> Faculty of Mechanical Engineering Technion - Israel Institute of Technology, Haifa, Israel Supervisor: Professor Oleg V. Gendelman Dissertation title: "Stationary and Transient Nonlinear Processes in Engineering Systems"
03/2015	Bachelor of Science - B.Sc. Faculty of Mechanical Engineering Technion - Israel Institute of Technology, Haifa, Israel

ACADEMIC APPOINTMENTS

<i>Effective 10/2025</i>	Assistant Professor Faculty of Mechanical Engineering Technion – Israel Institute of Technology, Haifa, Israel
08/2023 – 07/2025	Postdoctoral Research Fellow Department of Mechanical Science and Engineering University of Illinois at Urbana-Champaign, Urbana, Illinois, USA Advisers: Professor Alexander F. Vakakis, Professor Kathryn H. Matlack, and Professor Lawrence A. Bergman
03/2022 – 07/2023	Postdoctoral Research Fellow Faculty of Mechanical Engineering Technion - Israel Institute of Technology, Haifa, Israel Advisers: Professor Oleg V. Gendelman and Professor Yuli Starosvetsky

PROFESSIONAL EXPERIENCE

2016-2018	Graduate Researcher Nordia Springs Ltd., Nordia, Israel Carried out experiments at Nordia Springs Factory using strain gauges, load cells, and a Spintron machine to measure dynamic stresses and forces acting on valve springs.
2012-2014	Research Assistant Technion Internal Combustion Engines Laboratory Faculty of Mechanical Engineering Technion - Israel Institute of Technology, Haifa, Israel Conducted experiments to investigate the laminar burning velocity of alcohol reforming products and the effects of cellularity on flame propagation.

TEACHING APPOINTMENTS

2022-2023	Teaching Fellow Faculty of Mechanical Engineering Technion - Israel Institute of Technology, Haifa, Israel.
2016-2022	Undergraduate Teaching Assistant Faculty of Mechanical Engineering Technion - Israel Institute of Technology, Haifa, Israel.

TEACHING EXPERIENCE

2016-2023	Taught weekly tutorials and led laboratory sessions across the following undergraduate-level courses at Technion: Frontal Tutorials: • Dynamics – 034010, TA in charge (2020-2023) • Solid Mechanics 1 – 034028 (2018-2023) • Solid Mechanics 2 – 034029 (2018-2022) • CAD Systems 1- 035003 (2016-2018) Laboratory Instruction: • Solid Mechanics 2 LAB (2018-2023) • Experimental Methods Laboratory - 034039. Vibration of 4 DOF (2016-2018)
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RESEARCH INTERESTS

- Acoustics, Structural Vibrations, and their Interaction (Vibro-Acoustics)
- Acoustic Metamaterials
- Topological Acoustics
- Nonlinear Dynamics
- Wave Propagation

PUBLIC PROFESSIONAL ACTIVITIES

Reviewing Activities:

Wave Motion; Nonlinear Dynamics; Journal of Sound and Vibration; Physical Review E; International Journal of Mechanical Sciences; Acta Mechanica

Conference and Judging Roles:

- Judge in the 2020 and 2021 ASME international mechanical engineering congress and exposition (IMECE) undergraduate student poster competitions
- Chairing the session entitled “Reduced-Order Modeling and System Identification” at the 10th European Nonlinear Dynamics Conference (ENOC 2022), Lyon, France, 2022.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

EUROMECH – European Mechanics Society
ASME - American Society of Mechanical Engineering
ASA - Acoustical Society of America
SAE - Society of Automotive Engineers

FELLOWSHIPS, AWARDS AND HONORS

08/2023-07/2025	The Council of Higher Education (CHE-VATAT), Postdoctoral fellowship for academic excellence
03/2022	David and Olga Pnueli award for excellent Ph.D. thesis Faculty of Mechanical Engineering Technion - Israel Institute of Technology
2019-2022	Sandor Szego Award for Excellence in Teaching <i>Permanent Excellent TA</i> (4x)
2018-2019	Technion Graduate School Scholarship for Traveling Students
2017-2021	The Neubauer Doctoral Fellowship Fund for Excellent Minority Students
2017	Key scientific article contributing to research excellence in science and engineering award by the Canadian research association AIE - Advances In Engineering
2015-2017	The Council for Higher Education in Israel: Scholarship Fund for Excellent Masters
2011-2015	NAM excellence program (an acronym in Hebrew for Outstanding Arab Youth), Technion - Israel Institute of Technology

PUBLICATIONS

Published papers in peer-reviewed journals

[J1]	Majdi Gzal, Morel Groper and Oleg V. Gendelman, “Analytical, experimental and finite element analysis of elliptical cross-section helical spring with small helix angle under static load”. <i>International Journal of Mechanical Sciences</i>, 130, 476-486 (2017). - Selected as "<i>a key scientific article contributing to research excellence in science and engineering</i>" by the Canadian research association AIE - Advances In Engineering. - Featured on AIE.
[J2]	Majdi Gzal and Oleg V. Gendelman, “Edge states and frequency response in nonlinear forced-damped model of valve spring”. <i>Nonlinear Dyn</i> 99, 661–678 (2020). Special Issue: In Memory of Professor Ali H. Nayfeh.
[J3]	Majdi Gzal, Bin Fang, Alexander F. Vakakis, Lawrence A. Bergman, Oleg V. Gendelman, “Rapid non-resonant intermodal targeted energy transfer (IMTET) caused by vibro-impact nonlinearity”. <i>Nonlinear Dyn</i> 101, 2087–2106 (2020).
[J4]	Majdi Gzal, Lawrence A. Bergman, Alexander F. Vakakis and Oleg V. Gendelman, “Extreme intermodal energy transfers through vibro-impacts for highly effective and rapid blast mitigation”. <i>Communications in Nonlinear Science and Numerical Simulation</i> 103 (2021).
[J5]	Alexander F. Vakakis, Oleg V. Gendelman, Lawrence A. Bergman, Alireza Mojahed and Majdi Gzal,” Nonlinear Targeted Energy Transfer: State-of-the-Art and New Perspectives”. <i>Nonlinear Dyn</i> 108, 1–31 (2022). - Feature Article: Dedicated to the memory of Professor Leonid Isakovich Manevitch - Best Paper Award, received at NODYCON 2023
[J6]	Joshua R. Tempelman, Alireza Mojahed, Majdi Gzal, Kathryn H. Matlack, Oleg V. Gendelman, Lawrence A. Bergman, Alexander F. Vakakis,” Experimental Inter-Modal Targeted Energy Transfer in a Cantilever Beam Undergoing Vibro-impacts”. <i>Journal of Sound and Vibration</i>, 539, 117212 (2022).

[J7]	Majdi Gzal , Juan E. Carrion, Mohammad A. Al-Shudeifat, Billie F. Spencer Jr, Joel P. Conte, Alexander F. Vakakis, Lawrence A. Bergman, Oleg V. Gendelman, “Seismic mitigation of a benchmark twenty-floor steel structure based on intermodal targeted energy transfer (IMTET)”. <i>Engineering Structures</i> , 283 , 115868 (2023).
[J8]	Majdi Gzal , Victor Kislovsky, Arif Hasan, Yuli Starosvetsky. “Analysis of the response of damped and parametrically driven, strongly anharmonic Klein-Gordon chain-Part 1: Phase locked traveling breathers”. <i>Chaos, Solitons & Fractals</i> , 168 , 113026, (2023).
[J9]	Majdi Gzal , Victor Kislovsky, Yuli Starosvetsky. “Analysis of the response of damped and parametrically driven, strongly anharmonic Klein-Gordon chain-Part 2: beat-waves”, <i>Chaos, Solitons & Fractals</i> , 173 , 113726, (2023).
[J10]	Majdi Gzal , Alexander F. Vakakis, Oleg V. Gendelman, “Vibroacoustics of a membrane-finite cavity resonator: Traditional and alternative approaches for analysis”. <i>Journal of Sound and Vibration</i> , 573 , 118214 (2024).
[J11]	Majdi O. Gzal , Oleg V. Gendelman, Lawrence A. Bergman, Alexander F. Vakakis, “How internal vibro-impact nonlinearities yield enhanced vibration mitigation”. <i>Nonlinear Dyn.</i> 112 , 17683–17708 (2024).
[J12]	Majdi O. Gzal , Oleg V. Gendelman, Lawrence A. Bergman, Alexander F. Vakakis, “Enhanced seismic mitigation through energy management using nonlinear energy sinks with clearance–contacts”. <i>Nonlinear Dyn.</i> (2024).
[J13]	Majdi O. Gzal , Joshua R. Tempelman, Kathryn H. Matlack, Alexander F. Vakakis, “Subwavelength topological interface modes in a multilayered vibroacoustic metamaterial”. <i>Frontiers in Acoustics</i> 2 :1489401 (2024).
[J14]	Majdi Gzal , Victor Kislovsky, Yuli Starosvetsky. “Emergence of relaxation beat-waves in genuinely nonlinear Klein-Gordon chain with bi-harmonic parametric excitation”. <i>Chaos, Solitons & Fractals</i> 189 , 115692 (2024).
[J15]	Yuval Veltman, Majdi Gzal , Oleg V. Gendelman. “Intermodal targeted energy transfer in two dimensions”. <i>Nonlinear Dyn</i> 113 , 14245–14263 (2025).
[J16]	Majdi O. Gzal , Lawrence A. Bergman, Kathryn H. Matlack, Alexander F. Vakakis, “Low-Frequency Sub-Bragg Phenomena in Multilayered Vibroacoustic Metamaterials”. <i>Wave Motion</i> 139 , 103601 (2025).

Submitted Papers (currently under review)

[J17]	Majdi O. Gzal , Lawrence A. Bergman, Kathryn H. Matlack, Alexander F. Vakakis, “Analytical Study of a Monolayered Vibroacoustic Metamaterial”. arXiv:2408.09660 (2025).
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Refereed Papers in Conference Proceedings

[C1]	Majdi Gzal and Oleg Gendelman, “Edge states in nonlinear model of valve spring”. Proceedings of the ASME 2019 International Mechanical Engineering Congress and Exposition. Volume 4: Dynamics, Vibration, and Control. Salt Lake City, Utah, USA. November 11–14, (2019). V004T05A087. ASME
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CONFERENCES (Presenters are indicated in bold)

1.	Majdi Gzal and Oleg Gendelman, “Design and Testing of Nonlinear Valve Springs”, The SAE Waste Heat Recovery Symposium 2018, May 23-24, Haifa, Israel
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2.	Majdi Gzal and Oleg Gendelman, “ <i>Design Optimization and Dynamic Analysis of Progressive Valve Springs Having an Elliptical Cross-Section</i> ”, The ASME 2018 Internal Combustion Engine Fall Technical Conference, November 4 - 7, 2018, San Diego, CA
3.	Majdi Gzal and Oleg Gendelman, “ <i>Design Optimization and Dynamic Analysis of Elliptical Cross-Section Helical Spring</i> ”, The ASME 2018 International Mechanical Engineering Congress & Exposition, November 9-15, 2018, Pittsburgh, PA
4.	Majdi Gzal and Oleg Gendelman, “ <i>Edge states and frequency response in nonlinear model of forced-damped valve spring</i> ”, The Seventh International Conference on Nonlinear Vibrations, Localization and Energy Transfer, July 01-04, 2019, Marseille, France
5.	Majdi Gzal and Oleg Gendelman, “ <i>Mathematical model for the nonlinear dynamics of the valve spring</i> ”, The 39th Dynamics Days Europe, September 2-6, 2019, Rostock, Germany
6.	Majdi Gzal and Oleg Gendelman “ <i>Edge states in nonlinear model of valve spring</i> ”. The ASME 2019 International Mechanical Engineering Congress and Exposition. November 11–14, 2019. Salt Lake City, Utah, USA
7.	Majdi Gzal , Alexander F. Vakakis, Lawrence A. Bergman, Oleg V. Gendelman, “ <i>Rapid non-resonant intermodal targeted energy transfer (IMTET) mechanism</i> ”. The Eighth International Conference on Nonlinear Vibrations, Localization and Energy Transfer, July 06-09, 2021, Ascona, Switzerland
8.	Majdi Gzal and Oleg Gendelman, “ <i>Strongly Nonlinear Forced Damped Model for the Dynamics of the Valve Spring</i> ”. The 10 th European Nonlinear Dynamics Conferences (ENOC 2022). July 17-22, 2022, Lyon, France.
9.	Majdi Gzal, Juan E. Carrion, M.A. Al-Shudeifat, B.F. Spencer Jr, Alexander F. Vakakis, Lawrence A. Bergman and Oleg V. Gendelman , “ <i>Intermodal targeted energy transfer (IMTET) concept in seismically excited model of twenty-story steel structure</i> ”. The 10 th European Nonlinear Dynamics Conferences (ENOC 2022). July 17-22, 2022, Lyon, France.
10.	Majdi Gzal, Victor Kislovsky, Arif Hasan, Yuli Starosvetsky , “ <i>Response of parametrically driven and damped strongly anharmonic Klein-Gordon chain</i> ”. The 10 th European Nonlinear Dynamics Conferences (ENOC 2022). July 17-22, 2022, Lyon, France.
11.	Yuval Veltman , Majdi Gzal and Oleg V. Gendelman, “ <i>Intermodal targeted energy transfer in a blast-excited 2D linear system with an elliptical hole</i> ”. The 10 th European Nonlinear Dynamics Conferences (ENOC 2022). July 17-22, 2022, Lyon, France.
12.	Majdi Gzal, Alexander F. Vakakis, Lawrence A. Bergman, Oleg V. Gendelman , “ <i>Enhanced seismic mitigation by means of clearance-type nonlinear energy sinks</i> ”. The 11 th European Nonlinear Dynamics Conferences (ENOC 2024). July 22-26, 2024, Delft, The Netherlands.
13.	Majdi Gzal, Victor Kislovsky, Yuli Starosvetsky , “ <i>Dynamics of Traveling Beat-Waves in the Damped-Driven Klein-Gordon chains</i> ”. The 11 th European Nonlinear Dynamics Conferences (ENOC 2024). July 22-26, 2024, Delft, The Netherlands.

TRAINING

<i>07/2023</i>	Attendee, CISM-AIMETA Advanced School on “Machine Learning for Fluid Mechanics”, Udine, Italy Coordinators: Professor Steven L. Brunton and Professor Bernd R. Noack.
<i>07/2022</i>	Attendee, CISM-AIMETA Advanced School on “Exploiting the Use of Strong Nonlinearity in Dynamics and Acoustics”, Udine, Italy Coordinators: Professor Oleg V. Gendelman and Professor Alexander F. Vakakis