Lea Beilkin-Sirota

Curriculum Vitae

School of Mechanical Engineering
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Education

Feb. 2016 : **PhD (direct track), Mechanical Engineering**, *Technion – Israel Institute of Technology*.
Advisor : Prof. Yoram Halevi
Thesis : Fractional Order Control of Continuous Flexible Structures
Mar. 2008 : **BSc (cum Laude), Mechanical Engineering**, *Technion – Israel Institute of Technology*.

Academic Appointments

Tel Aviv University

July,2020 – present ***Senior Lecturer***.
School of Mechanical Engineering
Head of the Active Wave Control Lab

Feb.,2019 – June 2020 ***Postdoctoral Research Associate***.
The School of Physics and Astronomy
PI's: Dr. Yoav Lahini, Dr. Roni Ilan, Prof. Yair Shokef
Physics of Complex Systems Lab

Massachusetts Institute of Technology

Mar.,2016 – Dec.,2019 ***Postdoctoral Research Associate***.
Department of Mechanical Engineering
PI: Dr. Anuradha Annaswamy
Active Adaptive Control Lab

Publications

Refereed Journal Articles

2021 Lea Sirota, Daniel Sabsovich, Yoav Lahini, Roni Ilan, and Yair Shokef. Real-time steering of curved sound beams in a feedback-based topological acoustic metamaterial. *Mechanical Systems and Signal Processing*, volume 153, page 107479. Elsevier, 2021.

2021 Lea Sirota. Omnidirectional Klein-like tunneling of sound. *arXiv preprint arXiv:2107.04893*, 2021.

2020 Lea Sirota, Roni Ilan, Yair Shokef, and Yoav Lahini. Non-Newtonian topological mechanical metamaterials using feedback control. *Physical Review Letters*, volume 125, page 256802. APS, 2020.

2020 Lea Sirota and Anuradha M. Annaswamy. Active boundary and interior absorbers for one-dimensional wave propagation: Application to transmission-line metamaterials. *Automatica*, volume 117, pages 108–855, 2020.

2019 Lea Sirota, Fabio Semperlotti, and Anuradha M Annaswamy. Tunable and reconfigurable mechanical transmission-line metamaterials via direct active feedback control. *Mechanical Systems and Signal Processing*, volume 123, pages 117–130. Elsevier, 2019.

2019 Lea Sirota and Anuradha M Annaswamy. Active wave suppression in the interior of a one-dimensional domain. *Automatica*, volume 100, pages 403–406. Elsevier, 2019.

2018 Lea Sirota and Anuradha M Annaswamy. Modeling and control of wave propagation in a ring with applications to power grids. *IEEE Transactions on Automatic Control*, volume 64, pages 3676–3689. IEEE, 2018.

2015 Lea Sirota and Yoram Halevi. Fractional order control of the two-dimensional wave equation. *Automatica*, volume 59, pages 152–163. Elsevier, 2015.

2014 Lea Sirota and Yoram Halevi. The complete infinite series solution of systems governed by the wave equation with boundary damping. *Wave Motion*, volume 51, pages 114–124. Elsevier, 2014.

2013 Lea Sirota and Yoram Halevi. Modal representation of second order flexible structures with damped boundaries. *Journal of Vibration and Acoustics*, volume 135, page 064508. American Society of Mechanical Engineers, 2013.

2013 Lea Sirota and Yoram Halevi. Extended d'Alembert solution of finite length second order flexible structures with damped boundaries. *Mechanical Systems and Signal Processing*, volume 39, pages 47–58. Elsevier, 2013.

2010 Lea Sirota and Yoram Halevi. Free response and absolute vibration suppression of second-order flexible structures—the traveling wave approach. *Journal of Vibration and Acoustics*, volume 132, page 031008. American Society of Mechanical Engineers, 2010.

In Refereed Conference Proceedings

2021 Lea Sirota and Or Lasri. Temporal acoustic cloaking using real-time reconfigurable medium. In *International Conference on Microwaves, Communications, Antennas, Biomedical Engineering & Electronic Systems (COMCAS)*. IEEE, Accepted, 2021.

2021 Lea Sirota. Quantum tunneling analogue in real-time-controlled mechanical metamaterials. In *Fifteenth International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials)*. IEEE, Presented, 2021.

2020 Lea Sirota, Yoav Lahini, Roni Ilan, and Yair Shokef. Feedback-based topological mechanical metamaterials. In *Fourteenth International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials)*, pages 415–417. IEEE, 2020.

2017 Lea Sirota and Anuradha M Annaswamy. Spatially continuous modeling and control of swing dynamics in electric power grids. *IFAC-PapersOnLine*, volume 50, pages 4400–4405. Elsevier, 2017.

2016 Lea Sirota, Yoram Halevi, and Miroslav Krstic. On the relationship between the Absolute Vibration Suppression and Back-stepping methods in control of the wave equation with possibly unstable boundary conditions. In *American Control Conference (ACC), 2016*, pages 6709–6714. IEEE, 2016.

2015 Lea Sirota and Yoram Halevi. Fractional order control of flexible structures governed by the damped wave equation. In *American Control Conference (ACC), 2015*, pages 565–570. IEEE, 2015.

2014 Lea Sirota and Yoram Halevi. Wave based vibration control of membranes. In *American Control Conference (ACC), 2014*, pages 2729–2734. IEEE, 2014.

2012 Lea Sirota and Yoram Halevi. Modeling and control of flexible second order systems with damped boundaries. In *Engineering Systems Design and Analysis*, volume 44847, pages 607–613. American Society of Mechanical Engineers, 2012.

2012 L Sirota and Y Halevi. Traveling and standing waves in structures with damped boundaries. In *International Conference on Noise and Vibration Engineering, ISMA, Leuven, Belgium*, 2012.

2008 Lea Sirota, Irit Peled, and Yoram Halevi. Vibration suppression of flexible structures using the infinite dimensional laplace domain approach. In *Engineering Systems Design and Analysis*, volume 48364, pages 431–440, 2008.

Other Academic Activity

Organizing Seminars & Special Sessions in Conferences

Nov. 2021 Organizing the special session: Active Metamaterials and Metasurfaces. In *International Conference on Microwaves, Communications, Antennas, Biomedical Engineering & Electronic Systems (COMCAS)*

Participation in Conferences, Workshops and Seminars

Mar. 2022 **Invited talk.** In *International Meet on Metamaterials and Nanophotonics.* Dubai.

Dec. 2021 **Invited talk.** In *Global Summit on Metamaterials, Nanophotonics and Plasmonics.* London.

July 2021 Lea Sirota and Or Lasri. Hiding Acoustic Events in Time. **Invited talk.** In *Underwater Acoustics Symposium.* Tel Aviv University.

June 2021 Real-time controlled acoustic metamaterials imitating quantum wave phenomena. In *European Control Conference.* Rotterdam (virtual).

Apr. 2021 Metamaterials with programmed properties for waveguiding inspired by quantum mechanics. **Invited talk.** In *Materials Science & Nanoscience Webinar.*

Mar. 2021 Klein-like tunneling in acoustic metamaterials. In *American Physical Society March Meeting.* (virtual).

Apr. 2020 Lea Sirota, Yoav Lahini, Roni Ilan and Yair Shokef. Feedback-based Acoustic Metamaterials. Poster Session. In *Condensed Matter Analogies in Mechanics, Optics and Cold Atoms.* Tel Aviv University.

May 2015 All in One: Fractional Order Impedance Matching, Delay Compensation and Repetitive Control of the Damped Wave Equation. In *Graduate Students in Systems and Control seminar*, Technion - Israel Institute of Technology.

May 2013 Closed Loop Vibration Suppression of Membranes. In *Graduate Students in Systems and Control seminar*, Technion - Israel Institute of Technology.

May 2012 Modal Series of Damped-Damped Flexible Systems: Complete Solution and Applications to Control. In *Graduate Students in Systems and Control seminar*, Tel-Aviv University.

May 2011 Modeling and Control of Flexible Structures. In *Graduate Students in Systems and Control seminar*, Weizmann Institute of Science.

Invited Seminars

Dec. 2019 Feedback-Based Topological Mechanical Metamaterials - Designing unconventional wave propagation in real-time. Technion - Israel Institute of Technology.

Dec. 2018 Active control of wave propagation in systems. application to structural vibration, power grids & mechanical metamaterials. Tel Aviv University.

Dec. 2018 Tunable and reconfigurable mechanical transmission-line metamaterials via direct active feedback control. Structural Health Monitoring and Dynamics Laboratory, Purdue University.

Apr.2017 Active control of systems governed by wave equations. Nanophotonics and 3D Nanomanufacturing Laboratory, MIT.

Sep. 2016 Absolute vibration suppression control of wave equation networks. Application to electric power grids. Center for Nonlinear Studies, Los Alamos National Laboratory.

Fellowships & Awards

2018 EAGER NSF grant with the Active-Adaptive control Lab, MIT

2016–2017 MIT-Technion Postdoctoral Fellowship Program

2016–2017 Israel Council for Higher Education Postdoctoral Fellowship

2011–2014 Israel Ministry of Science & Technology Excellence Fellowship

2012 Vivian Konigsberg Award for Excellence in Teaching Assistance

2010 Benin Prize for Excellence in Graduate Studies

2008 Safra Prize for Excellence in Undergraduate Studies

2005–2007 Technion President Award for Excellence in Undergraduate Studies

Supervising Graduate Students

Oct. 2020 – Sep. 2022 Or Lasri. MSc. student (direct track). School of Mechanical Engineering. Tel Aviv University.

Oct. 2020 – Sep. 2022 Omri Dalin. MSc. student. School of Mechanical Engineering. Tel Aviv University.

Supervising Undergraduate Students (Final Projects)

Oct. 2020 – Sep. 2021 Moran Idan. School of Electrical Engineering. Tel Aviv University.

Oct. 2020 – Sep. 2021 Itai Dotan. School of Electrical Engineering. Tel Aviv University.

Oct. 2020 – Sep. 2021 Ido Bookstein. School of Electrical Engineering. Tel Aviv University.

Oct. 2020 – Sep. 2021 Nadav Malachi. School of Electrical Engineering. Tel Aviv University.

Teaching

Oct. 2020 – present **Lecturer**. The School of Mechanical Engineering, Tel Aviv University

Courses : Introduction to Control, Dynamics and Control of Systems

2011–2015 **Teaching assistant**. The Faculties of Mechanical and Aerospace Engineering, Technion

Courses : Introduction to Control, Experimental Methods, Control Theory, Process Optimization, System Engineering

Other Professional Experience

2007–2010 Mechanical Engineering officer in an elite technological unit of I.D.F, Intelligence division.