

# **Curriculum Vitae**

## **Rami Katz**

### **Personal details**

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*Languages:* Hebrew (native), English (fluent), Russian (fluent)

### **Education**

*2022 - Today:* Postdoctoral researcher, Dept. of Electrical Engineering, Tel-Aviv University.  
Mentor: Prof. Michael Margaliot.

*2018 - 2022:* Ph.D. in Electrical Engineering, Dept. of Electrical Engineering, Tel-Aviv University.  
Supervisor: Prof. Emilia Fridman.  
Dissertation Title: New Methods for Output-Feedback Control of Parabolic Partial Differential Equations.

*2015 - 2017:* M.Sc. (Summa Cum Laude) in Applied Mathematics, Dept. of Mathematics, Tel-Aviv University.  
Supervisor: Prof. Adi Ditkowski.

*2011 - 2014:* B.Sc. (Summa Cum Laude) in Mathematics – Economics, Tel-Aviv University.

### **Editorial/Chairing duties**

- *2019 - Today:* Active reviewer of 7 leading journals in systems and control, including IEEE Transactions on Automatic Control, Automatica, Systems & Control Letters, European Journal of Control, Control system letters, and Journal of Robust and Nonlinear Control
- Session chair - European Control Conference. Netherlands, 06/2021.
- Session chair - 25th International Symposium on Mathematical Theory of Networks and Systems. Germany, 09/2022.

### **Teaching**

*2016 - 2022:* Teaching assistant and lecturer, Afeka College of Engineering, Tel-Aviv

*2012 - 2019:* Teaching assistant and lecturer, Dept. of Mathematics, Tel-Aviv University

- Over 10 years of teaching experience (100 hours a year) of undergraduate and graduate courses in mathematics and engineering at Tel Aviv University and Afeka College of Engineering.
- Selected courses include Nonlinear control systems (Lecturer, graduate course, 100 hours), Optimal control (TA, undergraduate course, 70 hours), Time-delay systems (TA, undergraduate course, 40 hours), Calculus (Lecturer, undergraduate course, 100 hours), Linear algebra (Lecturer, undergraduate course, 100 hours) and Complex analysis (Lecturer, undergraduate course, 150 hours).
- Co-supervision of 2 M.Sc. students (Idan basre and E.Attias, M.Sc. in electrical engineering. See [C1], [C7] and [J3]) and 1 Ph.D. student (Pengfei Wang, visiting Ph.D. student, School of Electrical Engineering, Tel Aviv University. See [C2], [C5] and [J2]).

## Honors and Awards

- Best student paper award finalist – European Control Conference 2021.  
[www.eng.tau.ac.il/~emilia/Best%20Student%20Paper%20ECC2021.pdf](http://www.eng.tau.ac.il/~emilia/Best%20Student%20Paper%20ECC2021.pdf)
- National fellowship for excellence in PhD. Studies. Funded by the KLA corporation ([www.kla.com](http://www.kla.com)), 2020-2021.
- Automatica's editor's choice award for the paper "Entrainment to subharmonic trajectories in oscillatory discrete-time systems", June 2020.  
[www.ramikatz.com/files/ugd/fbe1a9\\_5f1c13caabc646e5a5fc6113e0298e20.pdf](http://www.ramikatz.com/files/ugd/fbe1a9_5f1c13caabc646e5a5fc6113e0298e20.pdf)
- Award for outstanding lecturers. Afeka college of engineering ([www.afeka.ac.il](http://www.afeka.ac.il)), 2020.
- Excellence in Studies Prize. Funded by the Yitzhak and Chaya Weinstein Research Institute for Signal Processing, Tel Aviv University (Institute director: Prof. Arie Yeredor, [ariey@tauex.tau.ac.il](mailto:ariey@tauex.tau.ac.il)), 2018-2019.
- Tel-Aviv University Excellence in Studies Prize. Awarded during M.Sc. studies, 2016.
- Tel-Aviv University Excellence in Studies Prize. Awarded during B.Sc. studies, 2014.
- Selected to the "Gifted B.Sc. students' program", School of Mathematics, Tel-Aviv University 2014. The program allowed 6 students to proceed on a direct track from B.Sc. to M.Sc. studies, while participating in advanced research

## Invited talks

- Finite-dimensional observer-based control of parabolic PDEs (04/2021): Distributed parameter systems online seminar. International audience.
- Finite-dimensional observer-based ISS and L2-gain control of parabolic PDEs (12/2021): ISS and applications online seminar. International audience.
- Sampled-data control of parabolic PDEs (12/2021): Dept. of Applied Mathematics seminar at Tel Aviv University, Israel. Local audience.
- Constructive delayed control of distributed parameter systems (04/2022): Drakhlin's online seminar on functional differential equations. International audience.
- Multi-agent deployment via sampled-data control of Distributed Parameter Systems (06/2022): Ben-Gurion University Electrical Engineering Seminar, Beer-Sheva, Israel. In person presentation. Local audience.
- On the accuracy of Prony's method for stable super-resolution (03/2023): Ben-Gurion University Electrical Engineering Seminar, Beer-Sheva, Israel. In person presentation. Local audience.
- University of Passau systems and control seminar, Passau, Germany. 05/2023.
- University of Passau harmonic analysis seminar, Passau, Germany. 05/2023.

## Publications

### a. Journals

#### Published

- [J1] **R. Katz**, and E. Fridman - Global stabilization of a 1D semilinear heat equation via modal decomposition and direct Lyapunov approach. Automatica. 2023.  
<https://doi.org/10.1016/j.automatica.2022.110809> [IF: 5.97, Q1 (SJR, 2021)].
- [J2] P. Wang, **R. Katz**, and E. Fridman - Constructive finite-dimensional boundary control of stochastic 1D parabolic PDEs. Automatica, 2023.  
<https://doi.org/10.1016/j.automatica.2022.110793> [IF: 5.97, Q1 (SJR, 2021)].

- [J3] **R. Katz**, E. Attias, T. Tuller and M. Margaliot - Translation in the cell under fierce competition for shared resources: a mathematical model. *Journal of the Royal Society Interface*, 19, 197, 2022. <https://doi.org/10.1098/rsif.2022.0535> [IF: 4.293, Q1 (SJR, 2021)]
- [J4] **R. Katz** and E. Fridman - Finite-dimensional boundary control of the linear Kuramoto-Sivashinsky equation under point measurement with guaranteed L2 -gain. *IEEE Transactions on Automatic Control*, 67, 10, 2022. [10.1109/TAC.2021.3121234](https://doi.org/10.1109/TAC.2021.3121234) [IF: 6.11, Q1 (SJR, 2021)].
- [J5] **R. Katz** and E. Fridman - Delayed finite-dimensional observer-based control of 1D parabolic PDEs via reduced-order LMIs. *Automatica*, 142, 2022. <https://doi.org/10.1016/j.automatica.2022.110341> [IF: 5.97, Q1 (SJR, 2021)].
- [J6] **R. Katz** and E. Fridman - Global finite-dimensional observer-based stabilization of a semilinear heat equation with large input delay. *Systems & Control letters*, 165, 2022. <https://doi.org/10.1016/j.sysconle.2022.105275> [IF: 2.804, Q1 (SJR, 2022)].
- [J7] **R. Katz** and E. Fridman - Regional stabilization of the nonlinear 1D Kuramoto-Sivashinsky equation via modal decomposition. *The IEEE Control Systems Letters*, 6, 1814-1819, 2022. [10.1109/LCSYS.2021.3133492](https://doi.org/10.1109/LCSYS.2021.3133492) [IF: 2.77, Q1 (SJR, 2022)].
- [J8] **R. Katz** and E. Fridman - Sampled-data finite-dimensional boundary control of 1D parabolic PDEs under point measurement via a novel ISS Halanay's inequality, *Automatica*, 135, 2022. <https://doi.org/10.1016/j.automatica.2021.109966> [IF: 5.97, Q1 (SJR, 2021)].
- [J9] **R. Katz** and E. Fridman - Sub-predictors and classical predictors for finite-dimensional observer-based control of parabolic PDEs. *The IEEE Control Systems Letters*, 6, 626-631, 2022. [10.1109/LCSYS.2021.3084525](https://doi.org/10.1109/LCSYS.2021.3084525) [IF: 2.77, Q1 (SJR, 2022)].
- [J10] **R. Katz** and E. Fridman - Finite-dimensional control of the heat equation: Dirichlet actuation and point measurement. *European Journal of Control*, 2021, 62, 158-164. ECC Special Issue. <https://doi.org/10.1016/j.ejcon.2021.06.009> [IF: 2.649, Q1 (SJR, 2022)].
- [J11] **R. Katz** and E. Fridman - Delayed finite-dimensional observer-based control of 1-D parabolic PDEs. *Automatica*, 123, 2021. <https://doi.org/10.1016/j.automatica.2020.109364> [IF: 5.97, Q1 (SJR, 2021)].
- [J12] **R. Katz**, E. Fridman and A. Selivanov - Boundary delayed observer-controller design for reaction-diffusion systems. *IEEE Transactions on Automatic Control*, 66, No. 1, 275-282, 2021. [10.1109/TAC.2020.2973803](https://doi.org/10.1109/TAC.2020.2973803) [IF: 6.11, Q1 (SJR, 2021)].
- [J13] **R. Katz** and E. Fridman - Constructive method for finite-dimensional observer-based control of 1-D parabolic PDEs, *Automatica*, 122, 2020. <https://doi.org/10.1016/j.automatica.2020.109285> [IF: 5.97, Q1 (SJR, 2021)].
- [J14] **R. Katz**, M. Margaliot and E. Fridman - Entrainment to subharmonic trajectories in oscillatory discrete-time systems. *Automatica*, 140, 2020. <https://doi.org/10.1016/j.automatica.2020.108919> [IF: 5.97, Q1 (SJR, 2021)].
- [J15] A. Ditkowski and **R. Katz** - On spectral approximations with non-standard weight functions and their implementations to generalized chaos expansions. *Journal of Scientific Computing*, 79, 2019. [10.1007/s10915-019-00922-5](https://doi.org/10.1007/s10915-019-00922-5) [IF: 2.228, Q1 (SJR, 2019)].
- [J16] **R. Katz** and Y. Shkolnisky – Sampling and approximation of bandlimited volumetric data. *Applied and Computational Harmonic Analysis*, 47, 235-247, 2018. <https://doi.org/10.1016/j.acha.2018.11.003> [IF: 2.573, Q1 (SJR, 2019)].

#### Submitted

- [J17] **R. Katz**, N. Diab and D. Batenkov - On the accuracy of Prony's method for recovery of exponential sums with closely spaced exponents. Under review.

- [J18] **R. Katz**, F. Mazenc and E. Fridman – Matrix averaging and scalar averaging of rapidly varying linear systems via time-varying Lyapunov functions. Under review.
- [J19] **R. Katz**, N. Diab and D. Batenkov - Decimated Prony's method for stable super-resolution. Under review.

## **b. Conferences:**

### Published/Accepted

- [C1] **R. Katz**, I. Basre and E. Fridman - Network-based deployment of multi-agents without communication of leaders with multiple followers: a PDE approach. The 61st conference on decision and control. Mexico, 12/2022. **Oral presentation\ In proceedings.**
- [C2] P. Wang, **R. Katz**, and E. Fridman - Constructive method for boundary control of stochastic 1D parabolic PDEs. The 25th International Symposium on Mathematical Theory of Networks and Systems. Germany, 09/2022. **Oral presentation\ In proceedings.**
- [C3] **R. Katz** and E. Fridman - Global boundary stabilization of a semilinear heat equation via finite-dimensional nonlinear observers. The 25th International Symposium on Mathematical Theory of Networks and Systems. Germany, 09/2022. **Oral presentation.**
- [C4] **R. Katz** and E. Fridman - Regional stabilization of the nonlinear 1D Kuramoto-Sivashinsky equation via modal decomposition. The American Control Conference. USA, 06/2022. **Oral presentation\ In proceedings.**
- [C5] P. Wang, **R. Katz**, and E. Fridman – Finite-dimensional observer-based control of 1D stochastic parabolic PDEs. The American Control Conference. USA, 06/2022. **Oral presentation\ In proceedings.**
- [C6] **R. Katz** and E. Fridman - Sub-predictors vs classical predictors for finite-dimensional observer-based control of parabolic PDEs. The 60th conference on decision and control. USA, 12/2021. **Oral presentation\ In proceedings.**
- [C7] **R. Katz**, I. Basre and E. Fridman - Delayed finite-dimensional observer-based control of 1D heat equation under Neumann actuation. The European Control Conference. Netherlands, 06/2021. **Oral presentation\ In proceedings.**
- [C8] **R. Katz** and E. Fridman – Finite-dimensional control of the heat equation: Dirichlet actuation and point measurement. The European Control Conference. Netherlands, 06/2021. **Oral presentation\ In proceedings.**
- [C9] R. Katz and E. Fridman - Delayed Finite-Dimensional Observer-Based Control of 1-D Linear Heat Equation. 24th International Symposium on Mathematical Theory of Networks and Systems. UK, 08/2021. **Oral presentation\ In proceedings.**
- [C10] R. Katz and E. Fridman - Finite-Dimensional Observer-Based Control of the Kuramoto-Sivashinsky Equation Under Point Measurement and Actuation. 59th Conference on Decision and Control. South Korea, 12/2020. **Oral presentation\ In proceedings.**
- [C11] R. Katz and E. Fridman - Finite-Dimensional Observer-Based Controller for Linear 1-D Heat Equation: An LMI Approach. 21st IFAC World Congress. Germany, 07/2020. **Oral presentation\ In proceedings**
- [C12] R. Katz, E. Fridman and A. Selivanov - Network-Based Boundary Observer-Controller Design for 1D Heat Equation. 58th Conference on Decision and Control. France, 12/2019. **Oral presentation\ In proceedings.**

- [C13] R. Katz, M. Margaliot and E. Fridman - On Totally Positive Discrete-Time Systems. MED 2019: Mediterranean Conference on Control and Automation. Israel, 07/2019. **Oral presentation\ In proceedings.**
- [C14] **R. Katz**, F. Mazenc and E. Fridman - Stability by averaging via time-varying Lyapunov functions. Accepted to the IFAC World Congress 2023. Yokohama, Japan.
- [C15] C. Kitsos and **R. Katz** - Internal stabilization of three interconnected semilinear reaction-diffusion PDEs with one actuated state. Accepted to the IFAC World Congress 2023. Yokohama, Japan.

### Research Projects:

Rami Katz's research lies in **control theory of distributed parameter systems**, with strong emphasis on engineering applications, including models of fluid dynamics, chemical reactions and flame propagation. His Ph.D. thesis was dedicated to developing novel control\estimation algorithms for reaction-diffusion systems. This problem was extensively studied in the 80's. However, existing solutions were confined to only a small subset of such systems, and were mostly theoretical (i.e., not accompanied by efficient algorithms). Rami developed a novel theoretical framework for representing and analyzing distributed parameter systems, which allows to successfully handle a wide array of reaction-diffusion systems. This framework leads to effective control strategies for such systems in the presence of delays, sampled-data control, nonlinearities, disturbances, and uncertainties. The developed control strategies result in efficient control algorithms, which are backed by rigorous theoretical guarantees ([P1]). His recent works includes the **deployment of multi-agent systems** ([P1]) in the presence of communication networks and delays, analysis of **numerical models of amino acid translation** ([P3]) in synthetic biological systems, development of novel **algorithms for sparse signal recovery from noisy measurements** ([P2] and [P4]), and **constructive control methods for vibrational control** ([P1]).

[P1] *Delayed and sampled data control of ODE and PDE systems*. Israeli Science Foundation, 2018 - 2022. PI: Prof. Emilia Fridman (School of Electrical Engineering, Tel Aviv University). **Team member (researcher).**

[P2] *Super-resolution and computational inverse problems: hybrid modeling, performance bounds, and algorithms*. Israeli Science Foundation, 2020-2024. PI: Dr. Dmitry Batenkov (School of Mathematics, Tel Aviv University). **Team member (researcher).**

[P3] *Totally positive differential systems: theory and applications*. Israeli Science Foundation, 2019-2023. PI: Prof. Michael Margaliot (School of Electrical Engineering, Tel Aviv University). **Team member (researcher).**

[P4] *Stability of moment problems and super-resolution imaging*. Volkswagen Foundation Collaborative Grant, Research Cooperation Lower Saxony – Israel, 2020-2024 (<http://portal.volkswagenstiftung.de/search/projectDetails.do?ref=97990>). PI: Dr. Dmitry Batenkov (School of Mathematics, Tel Aviv University). **Team member (researcher).**