

# AMIT DOLEV

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Web: <http://dynamics.net.technion.ac.il/students/amit-dolev/>

## EDUCATION

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- Ph.D.** Technion – Israel Institute of Technology, October 2019  
Mechanical Engineering  
Dissertation: “Parametrically Excited Mechanisms for Selective Detection Identification and Actuation in Distributed Systems”  
Advisor: Prof. Izhak Bucher
- M.S.** Technion – Israel Institute of Technology, June 2015  
Mechanical Engineering during a direct doctoral track.  
Advisor: Prof. Izhak Bucher
- B.Sc.** Technion – Israel Institute of Technology, September 2013  
Mechanical Engineering  
Graduated *Summa Cum Laude*

## RESEARCH INTERESTS

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Mechanical vibrations and nonlinear dynamics  
Parametric resonators and amplifiers  
Acoustics, fluid structure interaction, and standing wave acoustic levitation  
Experimental identification and modeling of vibrating structures

## HONORS AND AWARDS

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- Excellence Scholarship - Funded by the Faculty** 2109  
Awarded for excellence in research and studies
- Best Paper Runner-Up Award in IFToMM 2018 ROTRDYNAMICS** 2018  
Awarded by The International Federation for the Promotion of Mechanism and Machine Science of the IFToMM 2018 Rotordynamics.
- Excellence Scholarship - Funded by the Faculty** 2108  
Awarded for excellence in research and studies
- Ministry of Science, Technology & Space: Active participation in international Conference\ Workshop for Doctoral Students** 2107  
Awarded to the top Israeli doctoral students countrywide
- Excellence Scholarship - Funded by the Faculty** 2107  
Awarded for excellence in research and studies
- Vivian Konigsberg Award for Excellence in Teaching** 2107

Awarded to outstanding TAs chosen by students

**Excellence Scholarship - Funded by the Faculty** 2106  
Awarded for excellence in research and studies

**Ministry of Science, Technology & Space, applied science and engineering scholarship for Ph.D. students** 2016  
Awarded to the top Israeli graduate students countrywide in all science and engineering fields

**KLA-Tencor Award for graduate students** 2106  
Awarded to two outstanding Ph.D. students each year by KLA-Tencor Company

**The Miriam and Aaron Gutwirth memorial fellowship** 2014  
Awarded for special excellence in research and studies

**Sidney and Beatrice Wolberg Award** 2014  
Awarded to an outstanding *Reamim* program graduate who continued to graduate school

## RESEARCH EXPERIENCE & INTERESTS

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**Standing wave acoustic levitation** 2017-2109  
Technion – Israel Institute of Technology, Haifa, Israel  
Advisor: Prof. Izhak Bucher

Research on standing wave acoustic levitation including acoustic field optimization by selecting amplitude and phase of multiple (about 70) ultrasonic speakers to manipulate the pressure field, thus shape Go'rkov potential and the minima locations. The aim is to manipulate levitated objects. Another thrust deals with single-axis levitators. By modulating the Go'rkov potential, the levitated objects are parametrically excited efficiently. The goal is to make them hop between potential minima in a controlled manner.

**Parametrically excited mechanisms for selective detection in Distributed systems and altering the radiated acoustic spectrum,** 2015-2018  
Technion – Israel Institute of Technology, Haifa, Israel  
Advisor: Prof. Izhak Bucher

- Derived analytical models and their solutions using asymptotic methods
- Verified the analytical models via numerical simulations (SIMULINK)
- Designed experimental rigs using CAD and FEM software
- Executed detailed structural parameters identification via advanced signal processing and identification algorithms
- Validated the models via experiments using a programmable real-time digital signal processor (DSP; dSPACE 1104)

**Technion Research & Development Foundation Ltd, Haifa, Israel** 2014

**Lab Engineer**, Dynamics laboratory

- Conceived & designed of experimental systems, electromechanical coupling, DSP operation, nonlinear dynamics

**Parametrically excited taut string with tunable boundary conditions** 2012-2013

Final research project of *Reamim* program for outstanding undergraduate students in Mechanical Engineering

Technion – Israel Institute of Technology, Haifa, Israel

Advisors: Prof. Izhak Bucher and Dr. Harel Plat

- Collaborated in Dr. Harel Plat's Ph.D. research
- Conducted experiments and analyzed the data
- Programmed a FE model of the parametrically actuated string in MATLAB

## TEACHING EXPERIENCE

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**Technion – Israel Institute of Technology**, Haifa Israel      October 2014 - March 2019  
**Teaching Assistant**, Mechanical Engineering

- Theory of vibrations – recitation 2015-2019  
Developed tutorials, homework, quizzes and exams
- Modeling and Identification in vibrating systems 2015-2019  
Assessed student learning
- Rotor dynamics 2017  
Assessed student learning
- Experimental methods laboratory – Lab instructor 2014-2015  
Developed lab procedures, experiments and accompanying  
MATLAB codes for DAQ and model fitting and signal processing

### **Bachelor Students Co-Advised (Final Project)**

Illy Perl and Matan Appelpaom, "Standing Wave Acoustic Levitation", October 2018  
Prof. Mark Darlow Prize in Mechatronics, 2018

## PUBLICATIONS

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### *Journal Publications*

**Dolev, A.**, Davis, S., and Bucher I., "Noncontact, dynamic oscillations of acoustically levitated particles by parametric excitation," *Physical Review Applied* 12 (2019): 034031. doi: 10.1103/PhysRevApplied.12.034031.

Bucher, I., Gabai, R., Plat, H., **Dolev, A.**, and Setter, E., "Experimental travelling waves identification in mechanical structures," *Mathematics and Mechanics of Solids* (2019): 1081286517732825. doi: 10.1177/1081286517732825.

**Dolev, A.**, and Bucher I., "Optimizing the dynamical behavior of a dual frequency parametric amplifier with quadratic and cubic nonlinearities," *Nonlinear Dynamics* (2018). doi: 10.1007/s11071-018-4174-5.

### ***Journal Publications (cont.)***

**Dolev, A.**, and Bucher I., “Dual frequency parametric excitation of a nonlinear multi degree of freedom mechanical amplifier with electronically modified topology,” *Journal of Sound and Vibration* 419 (2018): 420-435. doi: 10.1016/j.jsv.2018.01.008.

Gabai, R., Farkash, B., Plat, H., **Dolev, A.**, and Bucher I., “A vibrating mechanism for large amplitude, non-reciprocal motion, exploiting multiple buckling modes,” *Mechanism and Machine Theory* 121 (2018): 613-632.  
doi: 10.1016/j.mechmachtheory.2017.11.022

Tresser, S., **Dolev, A.**, and Bucher, I., “Dynamic balancing of super-critical rotating structures using low-speed data via parametric excitation,” *Journal of Sound and Vibration* 415 (2017): 59-77. doi: 10.1016/j.jsv.2017.11.029.

**Dolev, A.**, and Bucher, I., “Experimental and Numerical Validation of Digital, Electromechanical, Parametrically Excited Amplifiers,” *Journal of Vibration and Acoustics* 138, no. 6 (2016): 061001. doi:10.1115/1.4033897.

**Dolev, A.**, and Bucher, I., “Tuneable, non-degenerated, nonlinear, parametrically-excited amplifier,” *Journal of Sound and Vibration* 361 (2016): 176-189.  
doi:10.1016/j.jsv.2015.09.048.

### ***Conference Papers***

**Dolev, A.**, and Bucher, I., “Levitated and parametrically excited sphere dynamics in a single-axis ultrasonic levitator.” In the proceedings of NODYCON2019, Rome, Italy, February 17-20, 2019.

**Dolev, A.**, and Bucher, I., “Levitated and parametrically excited sphere dynamics in a single-axis ultrasonic levitator.” In NODYCON2019 Book of Abstracts (ISBN: 9788894422900), pp, 267-268. Springer, 2019.

Gabai, R., **Dolev, A.**, and Bucher, I., “A bi-stable mechanics, having multiple buckling modes to create a large amplitude, non-reciprocal motion.” In NODYCON2019 Book of Abstracts (ISBN: 9788894422900), pp, 389-390. Springer, 2019.

Tresser, S., **Dolev, A.**, and Bucher, I., “Balancing high-speed rotors at low rotation speeds using parametric excitation,” IFToMM 2018 ROTORDYNAMICS, Rio de Janeiro, Brazil, September 23-27, 2018.

**Dolev, A.**, Tresser, S., and Bucher, I., “Balancing rotating structures using slow-speed data via optimized parametric excitation and nonlinear feedback,” ISMA 2018 – International Conference on Noise and Vibration Engineering, Leuven, Belgium, September 17-19, 2018.

### *Conference Papers (cont.)*

**Dolev, A.**, and Bucher, I., “In situ topology modification for increased sensitivity in a multi-degree-of-freedom parametric amplifier,” ICCES 2017 – International Conference on Computational & Experimental Engineering and Science, Funchal, Madeira Island, Portugal, June 26-30, 2017.

Bucher, I., Tresser, S., and **Dolev, A.**, “Detecting imbalance of high-speed rotors with dual frequency parametric excitation,” ICCES 2017 – International Conference on Computational & Experimental Engineering and Science, Funchal, Madeira Island, Portugal, June 26-30, 2017.

**Dolev, A.**, and Bucher, I., “Analytical, numerical and experimental investigation of a tunable, nonlinear multi-degree-of-freedom parametrically excited amplifier,” ISMA 2016 – International Conference on Noise and Vibration Engineering, Leuven, Belgium, September 19-21, 2016.

**Dolev, A.**, and Bucher, I., “A parametric amplifier for weak, low-frequency forces,” IDETC/CIE 2015 – Proceeding of the ASME 2015 international design engineering technical conferences and computers & information in engineering conference, Boston, Massachusetts, USA, August 2-5, 2015.

Bucher, I., and **Dolev, A.**, “A new paradigm for parametric mechanical amplifier,” DINAME 2015 - Proceedings of the XVII International Symposium on Dynamic Problems of Mechanics, Natal, RN, Brazil, February 22-27, 2015.

### *Other conference / workshop contributions*

**Dolev, A.**, and Bucher, I., “Acoustically levitated sphere dynamics subjected to a parametric excitation”, the 2108 ISTAM symposium, Tel-Aviv, Israel, December 9, 2018.

**Dolev, A.**, and Bucher, I., “Tuned dual-frequency parametric excitation unveils hidden features”, China-Israel science and Engineering Eastern Guangdong Exchange Forum, Shantou University, China, April 26-27, 2018.

**Dolev, A.**, and Bucher, I., “Tuned dual-frequency parametric excitation unveils hidden features”, 2<sup>nd</sup> HKUST – Technion joint workshop, Hong Kong University of Science and Technology, Hong Kong, April 23-24, 2018.

**Dolev, A.**, and Bucher, I., “Dual frequency parametric excitation of a nonlinear multi degree-of-freedom amplifier”, the 1 MOST Conference, Tel-Aviv, Israel, June 18, 2017.

Tresser, S., **Dolev, A.**, and Bucher, I., “Balancing high speed flexible rotors using low rotation speed via parametric excitation”, the 34 ICME, Haifa, Israel, November 22-23, 2016.

**Dolev, A.**, and Bucher, I., “Tunable parametrically excited amplifier for selective detection in distributed systems”, the 33 ICME, Tel-Aviv, Israel, March 2, 2015.

*Other conference / workshop contributions (cont.)*

Bucher, I., and **Dolev, A.**, “Balancing a fast rotating system while spinning at low rotation speeds”, Predictive maintenance, harshness monitoring, society meeting, Haifa, Israel, January 8, 2015.

**PATENTS**

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Bucher, I., and **Dolev, A.**, “Method and system for parametric amplification,” Unites States, Patent, No. US 20170040913 A1.

**PROFESSIONAL SERVICE**

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**Referee:**

*Journals:*

- Journal of Vibration and Acoustics.
- Nonlinear Dynamics.

*Conferences:*

- NODYCON 2019, First International Nonlinear Dynamics Conference.

**COMMUNITY SERVICE**

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**Voluntary**

Advisor in a special Physics program for outstanding students, Ironi He Haifa, high school, September 2017 - March 2019.

**OTHER**

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Israeli Citizen

Captain in the Artillery corps, IDF (Reserve)