



Elbit  
Systems



Israel Aerospace  
Industries



Technion – Israel Institute of Technology  
Faculty of Mechanical Engineering  
Internal Combustion Engines Lab



# 10<sup>th</sup> Conference on Propulsion Technologies for Unmanned Aerial Vehicles

## Conference Program

Thursday, February 16, 2023

Shirley and Manny Ravet Auditorium, D. Dan and Betty Kahn Building  
Faculty of Mechanical Engineering, Technion, Haifa

8:30 – 9:00	<b>Welcome and Registration</b>
<b>Opening session</b>	<b>Chairman: Leonid Tartakovsky, Technion</b>
9:00 – 9:30	<b>Welcome:</b> <i>Alon Wolf</i> , Dean, Faculty of Mechanical Engineering, Technion <i>Yigal Ben-Shabat</i> , Head, Propulsion Branch, Directorate of Defense Research & Development, MAFAT <i>Emanuel Liban</i> , President, Association of Engineers, Architects and Graduates in Technological Sciences in Israel
9:30 – 10:00	<b>Keynote lecture:</b> <b>Future Prospects of Green and Environmentally Friendly Fuels for UAV Applications</b> <i>Avinash Kumar Agarwal</i> , Indian Institute of Technology Kanpur, India
<b>Plenary session</b>	<b>Chairman: Yitzhak (Itche) Hochmann, Edmatech</b>
10:00 – 10:30	<b>Considerations for Propulsion System selection for UAV</b> <i>Emanuel Liban</i> , Edmatech
10:30 – 11:00	<b>Propulsion systems based on mechanical energy storage</b> <i>Eran Sher</i> , Technion
11:00 – 11:30	<b>Failure Analysis of a Hermes 450 Engine Cut due to a Faulty Thermostat</b> <i>Shai Zvulun, I. Kaparovsky, A. Zehavi-Cohen</i> , Israel Air Force, IDF
11:30 – 11:50	<b>Coffee break</b>
<b>Noon session</b>	<b>Chairman: Michael Shapiro, Technion</b>
11:50 – 12:10	<b>Feasibility of non-emission aviation propulsion system</b> <i>Jacob Feldman</i> , IAI

12:10 – 12:30	<b>Increasing Rotary Powerplant TBO &amp; MTBO - The Road To 1000 Operating Hours</b> <i>Guy Ben-Haim</i> , Elbit Systems UEP
12:30 – 12:50	<b>Hybrid propulsion system concepts for tactical UAVs</b> <i>Itay Lowental</i> , Lowental Hybrid
12:50 – 13:05	<b>Best Student Poster Award Ceremony</b>
13:05 – 14:20	<b>Lunch</b>
<b>Afternoon session</b>	<b>Chairman: Nir Geva</b> , Elbit Systems
14:20 – 14:40	<b>A novel ultra-high efficiency hybrid cycle combining a fuel cell, internal combustion engine and thermochemical recuperation of the waste heat</b> <i>David Diskin and Leonid Tartakovsky</i> , Technion
14:40 – 15:00	<b>Engine Testing at Low Temperatures - Review and Practical Observations</b> <i>Hanan Kapara</i> , Elbit Systems UEP
15:00 – 15:20	<b>300W Micro Gas Turbines towards Enhancing Endurance of Unmanned Aerial Vehicle Applications</b> <i>Lukas Badum, Pavel Kovalyov, Salman Nbwani, Beni Cukurel</i> , Technion
15:20 – 15:40	<b>Water recuperation for a fixed-wing drone powered by on-demand hydrogen generator with fuel cell</b> <i>Lev Zakhvatkin, Taya Alizha Belberg, Alex Schechter and Idit Avrahami</i> , Ariel University
<b>Afternoon session</b>	<b>Chairman: Shaul Eliahou-Niv</b> , Israel Aerospace Industries
14:20 – 14:40	<b>Testing of reciprocating engines at simulated high-altitude conditions</b> <i>Rony Yacoel</i> , IAI
14:40 – 15:00	<b>UAS Fuel system design considerations and P.O.D</b> <i>Michael Ayzenberg</i> , Aeronautics
15:00 – 15:20	<b>Performance enhancement of a Wankel Engine through numerical simulation</b> <i>Shimon Pisnoy, Steven Frankel and Leonid Tartakovsky</i> , Technion
15:20 – 15:40	<b>Numerical Thermal Analysis of Cryo-adsorbed hydrogen storage system for airborne applications</b> <i>Daniel Tsukerman and Nir Tzabar</i> , Ariel University
15:40 – 16:00	<b>Coffee break</b>
<b>Panel session</b>	<b>Development trends in UAV Propulsion – where and when?</b>
16:00 – 16:30	<b>Moderator: Jacob Feldman</b> , Israel Aerospace Industries Panelists: E. Sher (Technion), E. Liban (Edmatech), Y. Ben-Shabat (MAFAT), N. Geva (Elbit Systems), I. Biner (Aeronautics)

<b>Closing remarks</b> 16:30 – 16:35	<b>Leonid Tartakovsky</b> , Chairman Organizing Committee
---	---

\* The Program is subject to changes

Conference language – English

An exhibition will take place in the Conference lobby, where the leading industries will demonstrate their latest developments in the field of UAV propulsion.

**Participation in the Conference is free of charge, however early registration is required (through the link: <https://forms.gle/GEbjppqptcHcTgmL9>) .**

**Conference Chairman:**

*Leonid Tartakovsky, Faculty of Mechanical Engineering, Technion – Israel Institute of Technology.  
Email address: [tartak@technion.ac.il](mailto:tartak@technion.ac.il)*

**Conference Secretary:**

*Ms. Shimrit Wagner-Lior, [shimrit.w@me.technion.ac.il](mailto:shimrit.w@me.technion.ac.il) Phone: +972-77-8871668, Fax: +972-4-8295710*

**Best Student Poster Selection Committee:**

Emanuel Liban, Israel Society of Mechanical Engineers – *Chairman*

Idan Biner, Aeronautics

Lena Jilin, IDF

Jacob Feldman, Israel Aerospace Industries

Yitzhak (Itche) Hochmann, Edmatech

Nir Geva, Elbit Systems

Itay Lowental, Lowental Hybrid

Michael Shapiro, Technion

Eran Sher, Technion

## Posters session

1. **Daniel Tsukerman**, Nir Tzabar: Thermal management of Cryo-adsorbed hydrogen storage system. The Department of Mechanical Engineering & Mechatronics, Ariel University.
2. **Adi Zur**, Leonid Tartakovsky: An advanced multichannel monolith reformer for onboard hydrogen production in IC Engine with High-Pressure Thermochemical Recuperation. Faculty of Mechanical Engineering, Technion.
3. **Michael Palman, Yohai Abraham**, Beni Cukurel: Additively Manufactured Incessantly Printed Engines. Faculty of Aerospace Engineering, Technion.
4. **Denis Buntin**, Leonid Tartakovsky: Multi-stage heat release of polyoxymethylene dimethyl ether 1 (PODE1). Faculty of Mechanical Engineering, Technion.
5. **Asher Netzer-Lichinitzer**, Leonid Tartakovsky: An advanced injector for direct injection of a hydrogen-rich reformat into an IC engine cylinder. Faculty of Mechanical Engineering, Technion.
6. **Si Shen, Enrico Rempe, Balram Sharma**, Joseph Lefkowitz: Stable Ignition in High-Speed Flow using Nanosecond-Pulsed High-Frequency Discharge. Faculty of Aerospace Engineering, Technion.
7. **Nir Druker**<sup>1</sup>, Gideon Goldwine<sup>2</sup>, J. Barry Greenberg<sup>1</sup>, Eran Sher<sup>1</sup>: A Numerical Study on Enhanced Radical Generation in Multi-Voltage Pulse Discharge Plasma for Improved Ignition. 1 - Faculty of Aerospace Engineering, Technion; 2 - Independent Advisor.
8. **Sharon Goldstein**: Development of autonomous driving technology for the Technion Formula-Student racecar, Technion.
9. **Doron Spiegel, Bar Turgeman**: Development of an electric powertrain for the Technion Formula-Student racecar, Technion.
10. **Majd Jaraysi, Ayham Abu Eid**: The world-lightest Formula-Student Technion racecar, Technion.
11. Boris Arav: Determination of basic parameters of unmanned aerial vehicles (UAVs) based on constructal law of design and evolution. Community of scientists and experts "RHV", Rehovot.
12. **Galia Faingold, Omer Kalitzky**, Joseph Lefkowitz: Plasma reforming of renewable ammonia mixtures for zero-carbon energy utilization. Faculty of Aerospace Engineering, Technion.
13. **Eyal Hayouk, Ofek Rapaport and Moshe Dery**, Idit Avrahami: Dual-Cycle Hydrogen Generator with a Water Feeding for Fuel-cell derived Ariel vehicles. Biomechanics center, Ariel University.
14. **Mordechai Kremer, Ofir Boaron, Nevo Levi**, and Idit Avrahami: On-demand Hydrogen Generator for Fuel-cell derived Marine vehicles. Department of Mechanical Engineering and Mechatronics, Ariel University.
15. **Avinash Kumar, Yosef Schrader** and Idit Avrahami: Miniature and Light Energy Pack based on Hydrolysis with Atmospheric Humidity. Department of Mechanical Engineering and Mechatronics, Ariel University.
16. **Ben Binyamin Ben David Holtzer** and Leonid Tartakovsky: Underexpanded Impinging Gaseous Jet Interaction with a Lubricated Cylinder Surface. Faculty of Mechanical Engineering, Technion.
17. **Dror Tapiero**<sup>1</sup>, **David Diskin**<sup>1</sup>, Nir Tzabar<sup>2</sup> and Leonid Tartakovsky<sup>1</sup>: Performance of a Solid-Oxide Fuel Cell Fed by Methanol Steam Reforming Products. 1 - Faculty of Mechanical Engineering, Technion; 2 - The Department of Mechanical Engineering & Mechatronics, Ariel University.

18. Oleg Gaspar: Compact UAV hybrid propulsion system considerations from the point of view of an ICE engineer.

A posters session will be open for audience during the whole Conference day. Poster presenters will make a 2-min presentation of their work. *Three best student posters will be awarded by certificates and prizes of 1500, 1000 and 500 NIS for the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> places, respectively* donated by **Association of Engineers, Architects and Graduates in Technological Sciences in Israel.**