



MECHANICAL ENGINEERING SEMINAR

Monday, April 17, 2022 at 14:30, D. Dan and Betty Kahn Building, Auditorium 1

Online: <https://technion.zoom.us/j/8996991299>

Sound Generated by Modern Rotating Machinery – Measurements and Modelling

Oksana Stalnov, Ph.D.

Associate Professor Faculty of Aerospace Engineering
Technion – Israel Institute of Technology

oksana.s@technion.ac.il

www.stalnov.net

During the last half a century, there has been a growing concern over the growth in noise pollution that comes as a direct result of the raised volume of automobile traffic, high-speed trains, and large aircraft. Most of these noise sources result from a given system's aeroacoustic response or sound generated by the interaction of a flow field with the given structure. Modern rotating machinery, such as engines, fans, and propellers, operate in increased turbulence, and the boundary layer does not remain attached during the operation cycle. As a result, these blades operate in highly turbulent inflow and often encounter gusts. Functioning in these harsh conditions affects aerodynamic performance and increases noise signature.

The main challenge in aeroacoustics is that the mathematical equations describing the sound generation by flow-structure interactions cannot be solved analytically in most cases of practical interest, particularly when the flow is highly unsteady and turbulent. The generation of sound waves involves complex mechanisms by which a tiny part of the flow energy is converted into sound. At the heart of my research is the question of how sound waves are generated when realistic flow conditions are introduced. Therefore, it is necessary to develop mathematical models to increase our understanding and simultaneously predict the coupling between flow and noise. Revealing this complex behaviour requires the combination of theory with state-of-the-art experiments.

Assoc. Prof. Oksana Stalnov leads the Experimental Aeroacoustic Research Group at the Faculty of Aerospace Engineering, Technion. She earned her B.Sc. (2005), M.Sc. (2005), and PhD (2013) from the School of Mechanical Engineering at Tel-Aviv University. As a centerpiece of her research laboratory, she has established at the Technion the first Anechoic Wind Tunnel and low-noise Anechoic Chamber facilities in Israel. Her research is in the field of experimental aeroacoustics and unsteady aerodynamics, with contributions in areas such as noise and flow control, turbulence ingestion noise, rotor aeroacoustics, leading and trailing edge noise (and control), tip vortex and vortex wakes, high Reynolds number wall boundary layers, and advanced aeroacoustic measurement techniques. At the Technion, she leads active and diverse research activities that are supported by government- and industrial-funded programs.



The talk will be given in English

Seminars Coordinator: Assoc. Prof. Matthew Suss.