BEN-GURION UNIVERSITY OF THE NEGEV
P.O.B 653, BEER-SHEVA 84105, ISRAEL

אוניברסיטת בן-גוריון בנגב
ת.ד. 653, באר-שבע 84105

DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

to be held on Thursday, December 27, 2018, at 11:00

in the Seminar Room (#117) of the Mechanical Engineering Building (#55)
at the Campus of the Ben-Gurion University of the Negev

Lagrangian Investigation of Canopy Flow Turbulence

Ron Shnapp
PhD Student
School of Mechanical Engineering
Tel Aviv University

ronshnapp@gmail.com
https://ronshnapp.wordpress.com

Abstract:

The understanding of canopy flows, such as air flow in and above urban regions, air flow above forests and fields, or water flow in between aquatic vegetation, is important for the proper modeling of many environmental processes. For example, the CO_2 and O_2 fluxes between the atmosphere and the surface through plant transpiration, or the dilution and mixing of polluted air in urban areas, are governed by the canopy flows in these environments. In the Lagrangian framework fluid properties are described on the position of fluid particles trajectories. This approach is natural in dispersion and transport problems, and it also forms the basis for the so-called "Lagrangian stochastic model" class of turbulent flows models. However, due to technical difficulties, experimental data on the canopy flows in the Lagrangian framework are very sparse.

We performed Lagrangian measurements of a canopy flow model situated inside the 14 meters long environmental wind tunnel laboratory at IIBR. Through the 3D-PTV method we obtained a one-of-its-kind dataset of Lagrangian measurements, both inside and above the canopy layer. We use the dataset to investigate Lagrangian flow characteristics in the canopy model; we derive Lagrangian statistics directly for the first time. For example, we provide unique measurements of Lagrangian acceleration and pair dispersion statistics in this setting. These results will serve to construct and validate dispersion models in the atmospheric surface layer.

Bio: Ron Shnapp started his Mechanical Engineering studies at Tel Aviv University in 2012. In 2013 he began working as a research assistant in Prof. Alex Liberzon's Laboratory, studying the effect of surface roughness on particle resuspension in turbulent flows. In 2015 he enrolled in the graduate program's direct track, working on a model for wafer particulate contamination in fabrication process. Now, working on his Ph.D., Ron performs an experimental investigation of a wind tunnel turbulent canopy flow. His focus is experimental fluid mechanics and the Lagrangian description of turbulence. Since 2015 he serves as a teaching assistant, lecturing on Thermodynamics, Fluid Mechanics and Heat Transfer. He published three scientific papers, with another one currently in review.