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DEPARTMENT OF MECHANICAL ENGINEERING

SEMINAR

to be held on Thursday, February 7, 2019, 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

Development of flowing-gas Diode Pumped Alkali Laser

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The seminar is based on PhD thesis supervised by
Prof. Salman Rosenwaks, Prof. Boris Barmashenko and Prof. Oren Sadot

Abstract:

Diode Pumped Alkali Lasers (DPALs) are studied extensively due to their great potential as high power lasers. Operation of high power DPALs is strongly influenced by the heat released to the active medium due to the optical pumping and lasing processes. The heat release causes significant temperature rise despite the high quantum efficiency of DPALs. A very efficient way to remove this heat is to circulate the gaseous active medium through the laser cell. A DPAL system containing such a circulation system is called "flowing-gas" DPAL.

Analysis of the operation of flowing-gas low power DPALs is crucial for designing high power devices. Here we report on an experimental and theoretical study of continuous wave flowing-gas Cs DPAL. In the calculations we used a 3D computational fluid dynamics model, solving the fluid mechanics and kinetics equations relevant to the laser operation.

Experimental study of two Cs DPALs - "static" (where the active medium is sealed in a closed cell) and "flowing-gas" systems- will be presented. Comparison between the measurements and calculations made it possible to estimate the contribution of the kinetic processes to the gas heating; evaluation of this contribution to the gas heating is crucial for designing high power flowing-gas laser, avoiding high temperatures in the laser cell by circulating the active medium in appropriate flow velocities.

Then, theoretical study of the possibility of scaling up Cs and K DPALs to MW class will be presented. For that aim, flowing-gas systems with supersonic transonic and subsonic flows are suggested.

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