



Grand Technion
Energy Program

תכנית האנרגיה ע"ש גרנד



תכנית האנרגיה ע"ש גרנד מתכבדת להזמין להרצאה סמינריונית שתיתן
ע"י:

אריאל ורדי

התכנית הבין-יחידתית לאנרגיה

בנושא:

Sorption-Based Refrigeration Using Acoustic Waves

A thermoacoustic heat pump/refrigerator uses acoustic power derived from electrical/heat sources to pump heat from a cool source to a hot sink. One of the most remarkable features of such thermoacoustic devices is that they have no moving parts - they demand nothing beyond the basic physics of the cavity and stack to force the compressions, expansions, displacements and heat transfers to happen at the right times. Therefore, no lubrication is needed, and no apparent wear will occur thanks to the simplistic design of thermoacoustic devices. Furthermore, these devices notably use pressurized noble gases as their working fluid, thus eliminating the use of toxic CFC-based gases. The research looks at how sorption-based thermoacoustics can increase the efficiency of these devices, compared to the classical conduction-based technology that precedes this new outlook .

We will present a theoretical model that has been derived based on previous research done in the lab along with an experimental setup that was used to prove the hypothesis. Both methods have shown the existence of the sorption-based mechanism and its ability to improve performance of thermoacoustic refrigerators. Experimental results have shown an improvement of up to 2-3 times the efficiency when using sorption-based thermoacoustics than when using the classical method. Theoretical results have shown good agreement with experimental results and predicted even better improvements, of up to 5 times the efficiency of the classical operation of thermoacoustic refrigeration when choosing to work with different gas mixtures and allowing optimal design and working conditions of the refrigerator. This discovery puts thermoacoustic refrigeration on the map to be a potential alternative technology to vapor-compression refrigeration and other upcoming technologies.

מנחה: פרופ"מ גיא רמון, הפקולטה להנדסה אזרחית וסביבתית

במסגרת עבודת מחקר לתואר מגיסטר

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באוודיטוריום מכון המים ע"ש גרנד, הפקולטה להנדסה אזרחית וסביבתית