סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ד' 18.05.22 (י"ז אייר, תשפ"ב), בשעה 13:30 אוד' 1 בניין דן קאהן, הפקולטה להנדסת מכונות.

מרצה: פרטוק שי

מנחים: פרופ' רוטשילד כרמל

על הנושא:

First true realization of Stirling open cycle for solar and waste heat conversion

The seminar will be given in English

תקציר ההרצאה :

Vast portion of reliable renewable energy in the electric grid is a prerequisite to achieving carbon neutrality. Solar power holds the key to achieving the Net Zero decarbonized energy systems. However, what to do when the sun is not shining. A small and efficient external-heat engine can support a modular concentrated solar power technology that generates 24/7 electricity. **However, small (<1MW) and efficient (>40%) external heat engines do not exist because of a thermodynamic limit**. In contrast to internal combustion, external-heat engines carry the heat into the engine by the heat capacity of the gasses. However, gasses have a poor heat capacity per volume and tend to behave as an ideal gas. This means that the gasses expansion in the engine when performing the thermodynamic work results in fast cooling, which arrests their expansion and limits the efficiency. Carnot and Stirling found that the highest possible efficiency for a heat engine requires isothermal expansion. In our concept, heat transfer fluid (HTF), such as molten salt, flows in a nozzle. Compressed air is injected into the nozzle in the form of bubbles. Their negligible heat capacity and large surface area result in isothermal expansion, which in turn accelerate the HTF in the nozzle. Converting the kinetic energy of the HTF to electricity is simply done by a "hydroelectric" like technology. Our preliminary experimental results, achieve >90% of isothermal expansion, which project on >40% engine efficiency operating at 500C. This open the way for disruptive technology in solar and waste heat applications, two of the most important challenges to mankind.

בברכה,

פרופ"ח אתי סאס

מרכז הסמינרים