הטכניון – מכון טכנולוגי לישראל
הפקולטה להנדסת מכונות

TECHNION – Israel Institute of Technology
Faculty of Mechanical Engineering

SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ד' 3.06.15 (ט"ז בסיון, תשע"ה), בבניין דן-קאהן, קומה 0, אודיטוריום 1, שעה 13:30.

יצוו:

Richard J. Roby, P.E., Ph. D., Leo D. Eskin, Ph.D.
LPP Combustion, LLC
Fountainhead Renewable Energy Systems and Technologies, LLC.
Partnership in Eastern Mediterranean Basin, China and South Africa

על הנושא:

Lean, Premixed, Prevaporized Combustion of Liquid Fuels: Technological Challenges and Benefits

להלן תקציר ההרצאה:

The development of Dry, Low Emissions (DLE) combustion systems for use with natural gas fired gas turbines brought a revolution to electric power production, providing an order of magnitude reduction in pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), unburned hydrocarbons (UHCs), and combustion generated particulates, without the need for the substantial water addition. Unfortunately, DLE has been limited to natural gas with tight fuel composition specifications and has not been achievable with liquid fuels, requiring power producers with a need to run on both natural gas and liquid fuels to have a dual-fuel gas turbine with two entirely different fuel delivery and combustion systems, depending on whether the gas turbine is operating on natural gas or on fuel oil. Moreover, even small amounts of natural gas liquids or higher hydrocarbons in the natural gas would cause autoignition and flashback that could rapidly destroy gas turbines, until now. The recent development of a real-time liquid fuel processing system, converting a range of liquid fuels into a substitute for natural gas – LPP Gas^{tm}, now allows Lean, Premixed, Pre-vaporized (LPP) combustion of liquids fuels. This fuel processing system allows LPP combustion of a wide range of liquid fuels in DLE natural gas combustion systems while providing nearly identical performance, emissions, and maintenance of the gas turbine. The LPP technology has been successfully demonstrated in commercial gas turbine DLE combustion systems and has achieved over 2,000 hours of clean power generation on a 30 kW Capstone C30 microturbine, testing for 15 different types of liquid fuels, including liquid propane, pentane, naphtha, and other liquids, blended with methane to simulate the vaporization of Natural Gas Liquids.
Emissions for all cases have been comparable to ordinary natural gas emissions, of 3 ppm NOx and 30 ppm CO. Autoignition of the vaporized liquid fuels in the gas turbine is controlled by the fraction of inert diluent added in the vaporization process. The LPP technology is able to process a wide range of hydrocarbon liquid compositions up to No. 2 fuel oil and biodiesel, and even varying liquid fuels stream compositions – by continually adjusting the amount of dilution to maintain a heating value consistent with natural gas.

Results of actual gas turbine testing in a Solar Turbine Taurus 60 combustor and Capstone C-30 gas turbine will be presented, as well as detailed thermodynamic modeling of several different commercial gas turbines, to demonstrate the efficiency benefits of LPP Combustion compared to conventional gas turbine spray combustion of liquid fuels.

המארח : פרופ' מיכאל שפירא

בברכה,

שרון'נא אמיר שמן
מרכז הסמינרים