DEPARTMENT OF MECHANICAL ENGINEERING SEMINAR SERIES

PERSONALIZED ENVIRONMENTAL CONTROL SYSTEMS (PECS)

Friday, April 7, 2017 | 3:00pm
2164 Martin Hall, DeWALT Seminar Room

ABSTRACT

Buildings account for nearly 40% of the US annual energy consumption, much of which is for HVAC equipment. Research by the Center for the Built Environment at the University of California, Berkeley indicates that over ~20% of the US energy used for HVAC could be saved if the thermostat set-point range is widened by ±4°F in the summer and winter respectively. However, doing so will result in increased thermal dissatisfaction among the building occupants and a possible loss of productivity. To realize the energy saving potential of widening the thermostat setpoint range, local thermal management systems (LTMS) must be employed to provide comfortable thermal conditions in the occupant’s personal micro environment. The US DOE ARPA-E estimates that if such LTMS are used widely across the US, nearly 15% of the energy used for building HVAC could be saved, which is equivalent to an annual US savings of 1.8 quads (1015 Btu). This presentation covers the analytical and experimental research associated with the development of a novel, micro environmental control systems (QX) that is designed to provide ~60W of cooling efficiently to a seated office occupant, and highlight its design and performance attributes.

BIO

Dr. H. Ezzat Khalifa is NYSTAR Distinguished Professor of Mechanical and Aerospace Engineering at Syracuse University, where he teaches topics in thermo-fluid dynamics, energy conversion and technology valuation. He conducts research on distributed environmental control, and high-efficiency power and cooling systems for data centers. He has 50 years of R&D experience in energy conversion and environmental control systems. Before joining SU, he served as the Director of the Carrier R&D Program at United Technologies Research Center, where he was responsible for planning and executing a diversified portfolio of R&D in innovative environmental control and energy conversion technologies. Prior to this, Dr. Khalifa was the Director of Engineering for the Carrier Carlyle Compressor Division, where he oversaw all aspects of the development and reliability of vapor compressors for air-conditioning and refrigeration. Dr. Khalifa holds 9 patents, is author/coauthor of over 125 papers and is co-editor and co-author of “Sourcebook on the Production of Electricity from Geothermal Energy”. Dr. Khalifa holds a Ph.D. in Thermodynamics & Fluid Dynamics from Brown University. He is Fellow of ASME, and ASHRAE, and member of AIAA, APS, and Sigma Xi.

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