

MECHANICAL ENGINEERING GRADUATE SEMINAR

Thursday, September 1, 2011
Room ME 1061, 4:30 p.m.
Mechanical Engineering Building

Sustainable Thermal Energy Utilization from Micro to Megawatt Scales

Srinivas Garimella

*Professor and Director, Sustainable Thermal Systems Laboratory
Georgia Institute of Technology, Atlanta, GA*

Abstract

Efforts at improving energy efficiency have typically involved component or device efficiency improvements, which limits energy use reductions to a few percent, for specific end uses. While such improvements are desirable, their impact on energy utilization at the national and global level is small. This talk will focus on revisiting the current global energy utilization paradigm, and suggest approaches to cascade primary energy utilization over several end uses across the temperature spectrum such that waste heat is minimized to the thermodynamically unavoidable levels. Such approaches yield substantial reductions in the carbon footprint of global energy utilization. In addition, techniques to not only harvest waste heat, but to upgrade it to produce power, cooling, and upgraded heat will be discussed. In the quest to “chase down the last Joule” from the source efficiently, a variety of technologies to harness, transform, store and transfer thermal energy will be presented. In particular, research being conducted at the Sustainable Thermal Systems Laboratory to exploit the advantages of microscale heat and mass transfer not only in small-scale devices, but also to extend them to Megawatt-scale applications will be presented. Thermally cascaded energy utilization systems for automotive, space-conditioning, electronics cooling, waste heat recovery, and portable cooling for the military, fire-fighting and other hazardous duty applications will be presented. The talk will demonstrate that improvements on the end-use side can have a significant impact on the supply, demand and intermediate stages of the energy pathway.

Brief Biography

Dr. Srinivas Garimella is a Professor in the Woodruff School of Mechanical Engineering and Director of the Sustainable Thermal Systems Laboratory at Georgia Institute of Technology. He received M. S. and Ph.D. degrees from The Ohio State University, and a Bachelors degree from the Indian Institute of Technology, Kanpur. He has held prior positions as Research Scientist at Battelle Memorial Institute, Senior Engineer at General Motors Corp., and Associate Professor at Western Michigan University and Iowa State University. He is a Fellow of the American Society of Mechanical Engineers, an Associate Editor of the ASME Journal of Heat Transfer, and Editor of the International Journal of Air-conditioning and Refrigeration. He has also served as Associate Editor of the ASME Journal of Energy Resources Technology, and Past Chair of the Advanced Energy Systems Division of ASME. He was an Associate Editor of the ASHRAE HVAC&R Research Journal and Chair of the ASHRAE Technical Committee on Absorption and Heat Operated Machines, and is on the ASHRAE Research Administration Committee. He held the William and Virginia Binger Associate Professorship of Mechanical Engineering at ISU from 1999-2001. He has mentored over 45 graduate students, with his research resulting in over 150 archival journal and conference publications, and he has been awarded five patents. He is the recipient of the NSF CAREER Award (1999), the ASHRAE New Investigator Award (1998), the SAE Ralph E. Teetor Educational Award for Engineering Educators (1998), and was the Iowa State University Miller Faculty Fellow (1999-2000) and Woodruff Faculty Fellow (2003-2008) at Georgia Tech.

Refreshments will be served at 4:00 pm in ME 2137 located in the new Gatewood Wing.