seminar

SEMTE

A Multi-Scale Thermal Approach for Sustainable Energy Systems

School for Engineering of Matter, Transport and Energy

abstract

Sustainable systems for the storage and conversion of energy are dependent on interconnected processes ranging from basic thermal-fluid phenomena to system integration and operation. In this seminar, a multi-scale research approach that accounts for these interactions is introduced through investigations of the fundamentals of multi-component heat and mass transfer, microscale condensation and supercritical gas cooling of natural working fluids. These insights are applied to the development of advanced energy systems for harvesting low availability thermal energy and for providing integrated power, cooling and heating in compact packages. Thermal systems utilizing environmentally friendly working fluids for high-efficiency water heating and waste heat driven cooling will be presented. With such a research approach as a basis framework, the development of new sustainable energy technologies for applications including high performance buildings, renewable energy conversion, and energy storage can be streamlined by identifying and addressing system-level thermodynamic and economic bottlenecks through targeted fundamental investigations.

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biosketch

Mr. Brian Fronk is a Ph.D. candidate in the Woodruff School of Mechanical Engineering at Georgia Institute of Technology, working in the Sustainable Thermal Systems Laboratory under the direction of Dr. Srinivas Garimella. He received his M.S. in Mechanical Engineering (2007) from the Georgia Institute of Technology and a B.S. in Mechanical Engineering (2005) from the Pennsylvania State University. He has held prior positions at Carrier Corp., where he worked in the areas of CO_2 compression and transport refrigeration, and served as the primary instructor for Thermodynamics at Georgia Tech's international campus in Metz, France, and Energy Systems Design and Analysis at Georgia Tech in Atlanta. His research in the areas of microscale heat and mass transfer, two-phase flow, natural refrigerants, advanced heat pump systems, and sustainable energy portfolios has resulted in over 20 archival journal and conference publications. He is the co-author of Condensation Heat Transfer, to appear in the *World Scientific Press Reference on Two-Phase Flow and Heat Transfer* series. Mr. Fronk is also the recipient of the ASHRAE Graduate Student Grant-in Aid award (2011-2012) and the ASME Graduate Teaching Fellowship (2011-2013).

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