Announcing the Final Examination of Monica Bonadies for the degree of Master of Science

Time & Location: July 7, 2010 at 2:00 PM in ENG 2 202
Title: Analysis and Optimization of a Solar Thermal Collector with Integrated Storage

Solar energy, a topic popular in the United States during the oil embargo of the 1970’s, has become a relevant topic once more with the current focus on reducing greenhouse emissions. Solar thermal energy in particular has become popular as it uses existing steam turbine technology to produce electricity, with the benefit of using solar energy to produce steam rather than coal or nuclear heat sources. Solar thermal can also be used at lower temperatures to heat water for pools or for residential use. While this energy source has its benefits, it has the problem of being opportunistic - the energy must be used as it is captured. With the integration of storage, a solar thermal system becomes more viable for use. In this work, a low temperature (50-70 C) thermal storage unit with a solar thermal collector is experimentally run then studied using both analytical and numerical methods. With these methods, suggestions for future developments of the storage unit are made. The prototype collector and storage combination tested worked best during the winter months, when there was low humidity. Furthermore, the heat exchanger design within the storage unit was found to work well for charging (heating) the unit, but not for discharging the storage to heat water. The best modeling method for the storage unit was the use of FLUENT, which would allow for the suggested changes to the prototype to be simulated before the next prototype was constructed.

Major: Mechanical Engineering / Thermofluids

Educational Career:
Bachelor’s of Mechanical Engineering, BS, 2009, University of Central Florida

Committee in Charge:
Dr. Jay Kapat, Chair, MMAE
Dr. Louis Chow, UCF/Mechanical, Materials and Aerospace Engineering
Dr. Ali Gordon, UCF/Mechanical, Materials and Aerospace Engineering
Dr. Muthusamy Swami, UCF / Florida Solar Energy Center
Dr. Nicoleta Sorloaica-Hickman, UCF / Florida Solar Energy Center
Dr. Ratan Guha, UCF / Electrical Engineering and Computer Science

Approved for distribution by Dr. Jay Kapat, Committee Chair, on June 1, 2010.

The public is welcome to attend.