Announcing the Final Examination of James Hughes for the degree of Master of Science

Time & Location: November 6, 2009 at 8:30 AM in ENG I 307
Title: Design of Sea Water Heat Exchanger for Miniature Vapor Compression Cycle

Recent advances in the development of miniature vapor compression cycle components have created unique opportunities for heating and cooling applications, specifically to human physiological requirements that arise in extreme environments. Diving in very cold water between 1.7 and 5Â°C requires active heating because passive thermal insulation has proven inadequate for long durations. To maintain diver mobility and cognitive performance, it is desirable to provide 250 to 300 W of heat from an un-tethered power source. The use of a miniature vapor compression cycle reduces the amount of power (batteries or fuel cell) that the diver must carry by 2.5 times over a standard resistive heater. This study develops the compact evaporator used to extract heat from the sea water to provide heat to the diver. The performance is calculated through the application of traditional single-phase and two-phase heat transfer correlations using numerical methods. Fabrication methods were investigated and then a prototype was manufactured. A test stand was developed to fully characterize the evaporator at various conditions. The evaporator is then evaluated for the conditions of interest. Test results suggest the correlations applied under predict performance by 20%. The evaporator tested meets the performance specifications and design criteria and is ready for system integration.

Major: Mechanical Engineering

Educational Career:
Bachelor's of Mechanical Engineering, 2006, University of Central Florida

Committee in Charge:
Dr. Louis Chow, Chair, Department of Mechanical, Materials, and Aerospace Engineering
Dr. Olusegun Ilegbusi, Department of Mechanical, Materials, and Aerospace Engineering
Dr. David Nicholson, Department of Mechanical, Materials, and Aerospace Engineering

Approved for distribution by Dr. Louis Chow, Committee Chair, on October 19, 2009.

The public is welcome to attend.