Announcing the Final Examination of Arash Zarmehr for the degree of Master of Science

Time & Location: April 4, 2019 at 1:30 PM in Partnership 2 141
Title: SIMULATION ANALYSIS OF A VENTILATED BUILDING INTEGRATED-PHOTOVOLTAICS AIR-GAP DUCT SYSTEM FOR NATURAL VENTILATION OF A BUILDING

We introduce a low-cost and low-maintenance wind-catcher duct system design addition to BIPV systems that increase airflow velocity and decrease air temperature resulting in increased performance for the PV system electricity output. The results of our work demonstrate the design can further enhance energy performance by utilizing the increased airflow from the duct system to naturally ventilate an attic. Similar benefits were observed for different variations of the design under a parametric analysis finding the most optimal configuration to increase airflow velocity and decrease temperature.

Building integrated photovoltaics (BIPV) is becoming more popular and widely used to increase sustainability and decrease overall energy costs. Improving (BIPV) efficiency will benefit a wide range of applications in architecture and mechanical engineering. (BIPV) provides savings in electricity costs, lower pollution, and reduce material costs by utilizing renewable energy. BIPV functions as the outer layer of a structure, and therefore influence the heating and cooling loads of a building due to the change in thermal resistance. A BIPV ventilation air-gap system and its effects on heating and cooling loads are presented in this thesis. We use a computational fluid dynamics (CFD) model to analyze various ventilation strategies in the BIPV air-gap, and as well as the impact of using that air to naturally ventilate the attic for better building energy performance.

Major: Modeling and Simulation

Educational Career:
Bachelor's of Mechanical Engineering, BS, 2012, University of Isfahan
Master's of Mechanical Engineering, MS, 2018, University of Central Florida

Committee in Charge:
Joseph Kider, Chair, Modeling and Simulation
Paul Wiegand, Associate Professor
Muthusamy V Swami, Adjunct professor

Approved for distribution by Joseph Kider, Committee Chair, on January 20, 2019.

The public is welcome to attend.