Announcing the Final Examination of Elie El Zghayar for the degree of Doctor of Philosophy

Time & Location: November 17, 2015 at 8:30 AM in Engineering Building II 202A
Title: Fiber-Reinforced Polymers (FRP) COMPOSITES IN RETROFITTING OF CONCRETE STRUCTURES: POLYURETHANE SYSTEMS VERSUS EPOXY SYSTEMS

Fiber reinforced polymer (FRP) composites have been of interest to the structural engineering society since the earliest days of FRP composites industry. The use of such systems has been implemented in both new construction and for repair and rehabilitation of existing structures. Since the 1980's researchers have developed a significant body of knowledge to use FRP composites in infrastructures; however, most of this established knowledge was concentrated on the use of traditional epoxy systems (epoxy matrix FRPs and epoxy adhesives). FRP composites with polyurethane (PU) matrices and adhesives have recently attracted the attention of a few researchers due to their great advantages in constructability and mechanical properties. These systems are still missing a significant amount of knowledge. This research acquires this missing information and compares the PU systems with the epoxy systems. The study presented in this dissertation allowed to highlight the advantages of each system when used to repair and rehabilitate concrete infrastructures. The research started with small scale experiments to identify the component level properties of the materials and bond to concrete, which include the flexural behavior as well as the pure shear behavior. The results of these small scale experiments developed the component level characterization of the bond and paved the way for the next level of the research which studied the behavior of each system at larger scales. The large scale experiments included flexural retrofitting of reinforced concrete girders and retrofitting of circular columns with FRP wraps.

Major: Civil Engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 2007, University of Central Florida
Master's of Structural and Geotechnical Engineering, MS, 2010, University of Central Florida

Committee in Charge:
Kevin Mackie, Chair, Civil, Environmental and Construction Engineering
Manoj Chopra, Department of Civil, Environmental and Construction Engineering
Hae-Bum Yun, Department of Civil, Environmental and Construction Engineering
Ashraf El-Bahy, AB Consulting Engineers and Department of Civil, Environmental and Construction Engineering

Approved for distribution by Kevin Mackie, Committee Chair, on September 2, 2015.

The public is welcome to attend.