Announcing the Final Examination of Veli Bugra Ozdemir for the degree of Master of Science

Time & Location: July 2, 2019 at 10:15 AM in Engineering I 381
Title: Shape Recovery of Carbon Nanopaper/ Shape Memory Polymer Composite

Thesis presents analytical discussion, experimental and modeling studies of shape recovery behavior of electrically activated Carbon Nanopaper(CNP)/Shape Memory Polymer(SMP) composite in order to estimate shape recovery. The composite structure studied consists of a CNP layer sandwiched by two SMP layers where the CNP layer acts as a flexible electrical heater when a voltage difference is applied. The behavior of CNP/SMP composite presents a coupled electrical “thermal” structural problem. The governing equations for the multiphysics behavior are derived. Revealed parameters as a result of analysis and effects of these parameters on the shape recovery behavior is studied. Shape memory polymer and carbon nanopaper are characterized. With the use of parameters that appear in analysis, a nonlinear, fully coupled electrical “thermal”structural finite element model is proposed and experiments are carried out to verify ability of multiphysics analysis and FE model to capture shape recovery of CNP/SMP composite. FE model found to capture mechanics of the shape recovery of the composite to some extent, and improvements are proposed for future work.

Major: Mechanical Engineering

Educational Career:
Bachelor’s of Mechanical Engineering, BS, 2017, Middle East Technical University

Committee in Charge:
Kawai Kwok, Chair, Mechanical & Aerospace Engineering
Ranajay Ghosh, Mechanical & Aerospace Engineering
Jihua Gou, Mechanical & Aerospace Engineering

Approved for distribution by Kawai Kwok, Committee Chair, on June 17, 2019.

The public is welcome to attend.