Morphing Wing Aircraft Using Piezoelectric Actuators

Using macro-fiber composites as aircraft control surfaces, rather than the hinged flaps of current aircraft, decreases energy and fuel consumption, and can increase wing versatility along with the aircraft's range and endurance. The purpose of this project is to design and fabricate these morphing-wing aircraft control surfaces using piezoelectric actuators. In the first phase of our project, we are fabricating the horizontal stabilizer control surfaces of our aircraft, and testing them under unloaded and loaded conditions. By this process, we will calibrate the control of the actuators, so that the pilot experiences the same reaction from the morphing wing as he would from a normal, hinged-flap wing. This, along with hysteresis analysis of the actuators, will remedy many of the problems experienced by other morphing-wing aircraft, which caused them to be almost impossible to control. By the conclusion of the project, we will have constructed and conducted flight tests with a fully morphing-wing aircraft.