1020-74-148 **Edward W. Swim*** (edward.swim@afit.edu), Air Force Institute of Technology, Dept. of Mathematics and Statistics, AFIT/ENC, 2950 Hobson Way, Wright-Patterson AFB, OH 45433, and **Padmanabhan Seshaiyer** (padmanabhan.seshaiyer@ttu.edu), Texas Tech University, Department of Mathematics and Statistics, Lubbock, TX 79409. *Nonlinear fluid-structure interaction models for biologically inspired elastic membrane wings.*

Recent developments in micro air vehicles (MAVs), characterized by their small size ($<$ 15cm in length) and low flight speeds, have tended towards the development of membrane wings due to unsatisfactory performance of fixed wing MAVs during high angles of attack or turbulent air flow. The wings of many insects are constructed of thin, deformable material that allows for high levels of stability and maneuverability which are desirable in MAVs. Before manufacturing sample vehicles based on a biologically inspired planform, it is crucial to construct numerical experiments that can provide information about critical aerodynamic properties of the MAV. In order to be able to simulate how such vehicles will respond to realistic flight conditions, we consider model problems designed to mimic how individual components interact with viscous flows. In particular, material nonlinearity of the elastic membrane that is used for a large part of the wing surface may play an important role in the accuracy of a simulation. As a consequence, varying degrees of geometric nonlinearity may be required in order to guarantee consistency within the model. In this talk we present a fluid-structure interaction methodology for nonlinear membrane wing dynamics. (Received August 25, 2006)