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**DEVELOPMENT OF SMALL UNMANNED AIR VEHICLE**

**M.F. Platzer, Distinguished Professor**  
**Department of aeronautics and Astronautics**  
**K.D. Jones, Research Assistant Professor**  
**Sponsor: Naval Research Laboratory**

**OBJECTIVE:** The objective of the proposed effort is the exploration and demonstration of flapping wing propulsion for small-unmanned air vehicles

**SUMMARY:** A mechanical flapping-wing device was built, allowing for the systematic evaluation of flapping wing performance over a broad parameter space. The mechanism flaps two airfoils with variable pitch and plunge amplitude and variable phasing, and allows for the inclusion of additional stationary wings. The thrust was measured with a laser device and compared with the numerical results obtained with a previously developed inviscid unsteady panel code. Also, a micro-air vehicle using two flapping airfoils was built and preliminary tests of this vehicle were initiated.

**ADVANCED MULTIDISCIPLINARY ANALYSIS AND DESIGN OPTIMIZATION  
METHODS FOR SUBSONIC TRANSPORT AIRCRAFT**

**M.F. Platzer, Distinguished Professor**  
**Department of aeronautics and Astronautics**  
**K.D. Jones, Research Assistant Professor**  
**Sponsor: McDonnell-Douglas Aircraft Company**

**OBJECTIVE:** To contribute to the development of advanced multidisciplinary analysis and design optimization methods for subsonic transport aircraft.

**SUMMARY:** This work entails the use/extension of two/three-dimensional computational fluid dynamics codes for inviscid or viscous subsonic flow over airfoils or aircraft configurations with emphasis on speeding up the computations by means of parallelization.