

**MECHANICAL ENGINEERING DEPARTMENT**  
**ME/IE 8773-8774**  
**AEM 8000**  
*Joint Seminar with AEM Department*

**DESIGN & MANUFACTURING SERIES**  
**Topic: BIO-MIMETICS**  
**Host: Kim A. Stelson**

**Should 747's Flap Their Wings? Technology and the Biomechanics of Flight**

by

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**Wednesday, October 12, 2005**  
**3:30-5:00 p.m.**  
**Room 3-180 EECS**

**Coffee and cookies will be available at 3:15 p.m. in Room 3-176 EECS before and after the seminar**

**ABSTRACT** — Engineers have borrowed some from birds' flight (e.g., turning), but airplanes are quite different from birds. Unlike airplanes with fixed wings, birds flap their wings to produce thrust, combining the functions of an airplane's wing and engine. The fundamental difference between flying animals and airplanes is the power source: animals use muscle, airplanes use rotating machinery. No animal has ever evolved a true rotating axle, and muscles only allow reversing, to-and-fro type motion. Bird wings evolved from an inherently mobile foreleg, and are flexible, stow-able, and self-repairing. Airplane wings, which must carry vastly larger loads, are none of these. Flapping wings promote maneuverability and active stabilization; similar developments in aircraft are parallel, not mimetic. Notwithstanding DeLaurier's ornithopter, the advantages of flapping flight do not translate well to person-carrying aircraft, but there are new areas of technology where flapping flight may prove useful.

**BIO** — I grew up near Dayton, Ohio, home of the Wright brothers and the Air Force Museum; that may be why I have always had an interest in flight. I received my BS from the University of Michigan in 1977, and my PhD from Duke University in 1982. Although I started out academically in marine biology, I eventually shifted my research focus to flight; my dissertation research was on maneuvering in dragonflies. I continue my interest in the mechanics of animal flight (with detours into the mechanics and energetics of crustacean swimming), with my recent focus on passive stability and stabilizing mechanisms in insect flight. I taught for a few years at Bellarmine College, in Louisville, Kentucky. In 1987, I joined the faculty of the Department of Entomology at the University of Kansas, where I have been ever since. My first book, *Nature's Flyers*, was published in 2002.

Informal Faculty Luncheon: Wednesday, October 12, 2005, 12:00 noon. Meet in 1100 ME and walk to lunch with other faculty. Prof. David Alexander will be able to attend.