

**MS05-025**

**Smart Skins and Actuators for Morphing Structures**

**Jinhao Qiu<sup>1</sup>, Hongli Ji<sup>1</sup>**

**1. State Key Laboratory of Mechanics and Control of Mechanical Structures, Nanjing University of Aeronautics and Astronautics, Nanjing, China, 210016**

*E-mail: qiu@nuaa.edu.cn*

Morphing technology on aircraft has found increased interest over the last decade because it is likely to enhance performance and efficiency over a wider range of flight conditions. Among key technologies in morphing aircraft, the deformable smart skin and light-weight driving actuators have been the main obstacles to the real-world implementation of morphing aircraft. The difficulties in the smart skin rest on the contradiction between its ability to resist aerodynamic load in the normal direction and the in-plane flexibility for morphing functions. This contradiction can only be solved by new skin structures, which give anisotropic stiffness for bending and in-plane deformation. In this article several skin structures for morphing aircraft, including wavy skin structure and honeycomb skin structure, are introduced. The actuators for morphing aircraft are required to have large stroke, large output force, good compactness, and good controllability. Several actuators for morphing aircraft, including shape memory alloy actuators and piezoelectric-hydraulic actuators, are introduced.

**Keywords:** morphing aircraft; piezoelectric-hydraulic actuators; smart skin; smart structure; anisotropic stiffness;

**Preferred Presentation Type:** lecture