Nonlinear Dynamic Characteristics and Resonant Actuation of Bi-stable Structures

Yuting Liu, *School of Aeronautic Science and Engineering, Beihang University*

Jiaying Zhang, *School of Aeronautic Science and Engineering, Beihang University*

In the fields of morphing aircraft, flow control and energy harvesting, dynamic characteristics of the multi-stable structure provide an idea for realizing change of the structure shape. Nonlinearity and local stability of multi-stable structures provide potential benefits for morphing structures as no energy is required to hold each stable configuration. This paper presents the dynamic characteristics of bi-stable laminate, including the effects of geometric dimensions and boundary conditions. Numerical simulation is used to study the nonlinear dynamic characteristics of each configuration and dynamic response under different excitation levels. A resonance actuation strategy leading to snap-through of bistable structure is investigated, and the realization conditions of single well vibration and cross well vibration are determined.

Keywords – morphing structure, bi-stable composite laminate, nonlinear dynamics, resonant actuation