

# Preliminary Study of a Variable-Camber Morphing Flap using Wire-Winding Mechanism

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## ABSTRACT

In the recent aeronautical research area the “Morphing” technology have been a significant topic for aerial vehicles. The objective of this concept is to develop “a bird-like wing” which has the ability to change its configurations to adapt multiple flight regimes or to obtain better aerodynamic performance.

The present study introduces a morphing flap with variable camber. Different from a conventional flap of an aerial vehicle the camber of the proposed morphing flap can be changed continuously. This continuous camber change can guarantee better aerodynamic performance.

A wire-winding concept (Fig. 1) is introduced to develop a morphing mechanism. If the wire at S1 is pulled to the left the upper pulley moves to the right at S2. Fig. 2 shows the proposed variable-camber morphing flap using this wire-winding mechanism. In the present study the proto-type of this morphing flap was designed and manufactured. And the structural stability of the flap was investigated by using finite element method and its load test was performed.

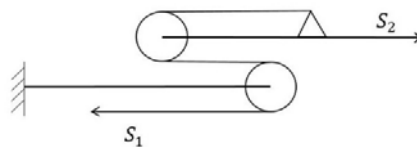


Fig. 1 Wire-winding Mechanism

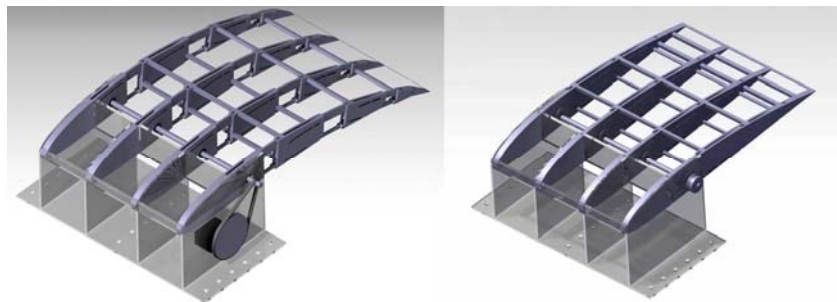


Fig. 2 Deployed/undeckployed morphing flap