

## **Parametric study on the flutter characteristics of a simple rectangular wing-box model with varying ribs orientation**

### **ABSTRACT**

A simple rectangular wing box model with varying rib orientations has been analyzed by observing the impact in terms of its aeroelastic characteristics. This parametric design study has been coded with the use of computer programming and made fully integrated with the finite element solver of the normal mode and flutter analyses. Three parametric assessments have been taken into account: with the first study focusing on the varying of individual rib orientation; the second study considering the whole ribs to be oriented in parallel; and the final study considers all possible combination of rib orientations within the pre-defined design space. The overall finding suggests the variation of rib's orientation resulted in increases of frequency spacing between the flutter modes, hence leading to significant improvement in aeroelastic performance with no additional weight penalty when compared to the baseline rib system. Among all the parametric design options, the zig-zag ribs configuration has turned out to be the best configuration with remarkable improvement in flutter speed of nearly 80%.

**Keyword:** Aeroelastic tailoring; Flutter; Wing design