

Preliminary investigation on experimental modal analysis of high aspect ratio rectangular wing model

ABSTRACT

Procedure of conducting an experimental modal analysis (EMA) of roving hammer test for high aspect ratio (HAR) wing containing geometric nonlinearities is presented along with consideration of various tip store sizes. Two sets of test setups of vertical and horizontal arrangements have been considered, which respectively demonstrates the undeformed and deformed cases. Modal properties in terms of natural frequency and mode shape were experimentally measured using the LMS Test.Lab package and the results were then compared between the undeformed and its corresponding deformed configuration. From the finding, it confirms that the chordwise and torsional modes of the undeformed configurations has respectively turned into chordwise-torsion and torsion-chordwise modes as they are in deformed configuration. Meanwhile, the impact related to bending modes is insignificant. Hence, this may result in inaccurate prediction if conventional aeroelastic solution is employed for HAR wing configuration.

Keyword: Aeroelasticity; Experimental modal analysis; Geometric nonlinear; High aspect ratio wing; Structural dynamics