

Materials challenges in the design of an insect-like flapping wing mechanism based on a four-bar linkage.

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Materials challenges in the design of an insect-like flapping wing mechanism based on a four-bar linkage

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Abstract

This paper describes materials challenges, and how they were met, in the design of a four-bar linkage mechanism driving a test-bed for an insect-like flapping wing micro air vehicle. In the design process, both aerodynamic and dynamic simulations were made, but could not resolve all uncertainties regarding the forces acting on the mechanism. This difficulty was resolved by a combination of: (1) a simulation parametric study; (2) an experimental programme devised according to the results of the study; (3) by the use of carbon/epoxy composite for critical elements. Application of carbon/epoxy composites not only allowed to overcome uncertainties, but also provided a potential for future research and development. A complete mechanism was manufactured, assembled and tested; it works reliably and generates useful data for further aeromechanical research.



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Keywords

Carbon/epoxy composite application; Insect-like flapping wings; Flapping mechanism; Micro air vehicles

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