Free vibration analysis of composite aircraft wing

Research Published: 02 July 2024

Volume 245, article number 125, (2024) Cite this article

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Aims and scope

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Abstract

As the aerospace industry continually seeks to enhance the performance and efficiency of aircraft structures, the implementation of advanced materials such as composites has become pivotal. This study focuses on the free vibration analysis of composite aircraft wings, aiming to understand and characterize the dynamic behaviour of these structures under various conditions. The research involves the development of a detailed finite element model considering the complex geometry and material properties inherent to composite structures. The investigation begins with a thorough review of existing literature on composite materials, structural dynamics, and free vibration analysis methodologies. Subsequently, a parametric study is conducted to explore the influence of key design parameters, including fibre orientation, stacking sequence, and ply thickness, on the natural frequencies and mode shapes of the composite wing. The outcomes of this study contribute valuable insights to the aerospace engineering community, offering a comprehensive understanding of the free vibration characteristics of composite aircraft wings. The findings provide essential information for the design and optimization of lightweight and structurally efficient aircraft components, fostering advancements in the development of next-generation aerospace vehicles.

Data availability

No datasets were generated or analysed during the current study.

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Contributions

M.L. Pavan Kishore, B.Madhavi: Wrote the paper with input from all authors, Contributed to the design and implementation of research, to the analysis of result and to the writing of the manuscript, R. Pugazhenthi, Pravat Ranjan Pati: Contributed to the design and implementation of research, Jayant Giri, T Sathish, A.Parthiban: Contributed to the design and implementation of research.

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Ethics declarations

Ethical approval

Not applicable.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interest

The authors declare no competing interest.

Additional information

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About this article

Cite this article

Pavan Kishore, M.L., Madhavi, B., Pati, P.R. *et al.* Free vibration analysis of composite aircraft wing. *Interactions* **245**, 125 (2024). https://doi.org/10.1007/s10751-024-01976-0

Accepted
26 June 2024

Published
02 July 2024

DOI
https://doi.org/10.1007/s10751-024-01976-0

Keywords

Aircraft blade Composite material Fiber orientation Ply layups