



# THE AERONAUTICAL JOURNAL

Covering all aspects of aerospace

Volume 124

Number 1275

May 2020



CAMBRIDGE  
UNIVERSITY PRESS

# THE AERONAUTICAL JOURNAL

**Editor-in-Chief: Professor Holger Babinsky**

## **Editorial Board**

**Chairman: Professor Mike Graham Deputy Chairman: Professor Chris Atkin**

## **Associate Editors**

**Professor Christian Allen**  
University of Bristol

**Professor George Barakos**  
University of Glasgow

**Professor Cees Bil**  
RMIT University, Australia

**Professor Rene de Borst**  
University of Sheffield

**Professor Jonathan Cooper**  
University of Bristol

**Peter Curtis**  
Aircraft Research Association

**Professor Laurent Dala**  
University of Northumbria

**Professor Dimitris Drikakis**  
University of Nicosia, Cyprus

**Professor Brian Falzon**  
Queen's University, Belfast

**Professor Antonio Filippone**  
University of Manchester

**Professor Song Fu**  
Tsinghua University, China

**Professor Ed Galea**  
Greenwich University

**Professor Victor Giurgiutiu**  
University of South Carolina

**Dr Guy Gratton**  
Cranfield University

**Professor Ismet Gursul**  
University of Bath

**Professor Li He**  
University of Oxford

**Professor Michael Henshaw**  
Loughborough University

**Professor Konstantinos Kontis**  
University of Glasgow

**Dr Arnab Majumdar**  
Imperial College, London

**Professor Jim McGuirk**  
Loughborough University

**Professor Jack McNamara**  
Ohio State University

**Dr Richard Markiewicz**  
DSTL

**Professor Pierangelo Masarati**  
University of Milan

**Professor Ning Qin**  
University of Sheffield

**Professor Jason Ralph**  
University of Liverpool

**Dr G Satheesh Reddy**  
MoD, India

**Professor Kenichi Rinoie**  
University of Tokyo

**Professor Ulrich Rist**  
University of Stuttgart, Germany

**Dr Matthew Santer**  
Imperial College, London

**Professor Marilyn Smith**  
Georgia Institute of Technology, USA

**Professor Constantinos Soutis**  
University of Manchester

**Professor Anthony Waas**  
University of Washington, USA

---

## **Aims and Scope**

The aims and scope of *The Aeronautical Journal* are intended to reflect the objectives of the Royal Aeronautical Society as expressed in its Charter of Incorporation. Briefly, these are to encourage and foster the advancement of all aspects of aeronautical and space science. Thus the topics of *The Aeronautical Journal* include most of those covered by the various Specialist Groups of the Society. Topics covered in *The Aeronautical Journal* include:

Aircraft design, aerodynamics, airworthiness and maintenance, air traffic Management, avionics and systems, composites, environmental issues, flight operations, flight simulation, fluid dynamics, fluid mechanics, guided flight, human factors, human powered flight, light aviation, propulsion, rotorcraft, safety, space, structures and materials, structural mechanics and UAVs.

Papers are solicited on all aspects of research, design and development, construction and operation of aircraft and space vehicles. Papers are also welcomed which review, comprehensively, the results of recent research developments in any of the above topics.

We recognise the inhibiting pressures of time and confidentiality, and acknowledge that many of the design testing, manufacturing and operational problems that industry has to solve contain important information for the whole aerospace community. Be assured that *The Aeronautical Journal* provides a renowned platform for refereeing and presenting your work to the broadest international audience.

Papers will be considered for publication in *The Aeronautical Journal* if they meet the terms and conditions listed in our instructions for authors available at: <http://journals.cambridge.org/AER>. If these are not met, the Editor reserves the right to withdraw the paper without redress, which may be at any time up to publication.

**Enquiries should be sent to: Wayne J Davis, RAeS Production Editor: [aerjournal@aerosociety.com](mailto:aerjournal@aerosociety.com)**

**Subscription enquiries should be sent to: [journals@cambridge.org](mailto:journals@cambridge.org) Papers should be submitted at: [www.edmgr.com/aerj](http://www.edmgr.com/aerj)**