



*The*  
**AERONAUTICAL  
JOURNAL**



**Volume 109, Number 1092**

**February 2005**

# The AERONAUTICAL JOURNAL

**Editor-in-chief: Prof John Stollery**

## Associate Editors

**Chairman: Prof Peter Bearman**

**Dr Holgar Babinsky**  
Cambridge University

**Dr Trevor Birch**  
Dstl

**Mr Tim Cansdale**  
Dstl

**Dr Graham Coleman**  
Dstl

**Prof Jonathan Cooper**  
Manchester University

**Mr Anthony Cross**  
BAE Systems Warton

**Prof Glyn Davies**  
Imperial College, London

**Prof Rene de Borst**  
Delft University

**Dr Olivier Dessens**  
Cambridge University

**Prof Dimitris Drikakis**  
Cranfield University

**Mr Chris Fielding**  
BAE Systems, Warton

**Prof Ismet Gursul**  
University of Bath

**Dr Michael J de C Henshaw**  
BAE Systems, Brough

**Prof Richard Hillier**  
Imperial College, London

**Mr Julian Lea-Jones**  
ERA Technology

**Prof Ken Morgan**  
University of Wales, Swansea

**Mr Pat Norris**  
LogicaCMG

**Prof Gareth Padfield**  
Liverpool University

**Dr Shahrokh Shahpor**  
Rolls-Royce

**Prof Constantinos Soutis**  
University of Sheffield

**Prof Anthony Waas**  
University of Michigan

### 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, which include:

Aircraft design, aerodynamics, air law, air power, air transport, air navigation, airworthiness and maintenance, aviation medicine, avionics and systems, environmental issues, flight operations, flight simulation, fluid dynamics, fluid mechanics, general aviation, guided flight, human factors, human powered flight, light aviation, management studies, propulsion, rotorcraft, safety, space, structures and materials, structural mechanics, systems and test procedures and UAVs.

Papers are therefore 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. *The Aeronautical Journal* provides a platform for refereeing and presenting your work to an international audience.

Papers will be considered for publication in *The Aeronautical Journal* if they meet the terms and conditions listed in The Instructions for authors. 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.

**Papers should be sent to: Prof John Stollery, The Royal Aeronautical Society, 4 Hamilton Place, London W1J 7BQ, United Kingdom.**

### Subscriptions

#### Non-members

Annual subscription (12 issues) £350, Single copies, including back issues £35; *Non-member subscription orders are available from;* Royal Aeronautical Society, Publications Subscriptions Department, Cary Court, Bancombe Trading Estate, Somerton, Somerset TA11 6TB, UK. Tel: +44 (0)870 442 0915, Fax: +44 (0)1458 271146, e-mail: ras@cisubs.co.uk

#### RAeS members

Annual subscription (12 issues) £55, Single copies, including back issues £6; *member subscription orders are available from;* Membership Department, Royal Aeronautical Society, 4 Hamilton Place, London W1J 7BQ, UK. Tel: +44 (0)20 7670 4300, Fax: +44 (0)20 7670 4309, e-mail: Membership@raes.org.uk

#### RAeS Conference Proceedings

Details, price and availability of Royal Aeronautical Society Conference Proceedings can be obtained from; Eurospan, 3 Henrietta Street, Covent Garden London WC2E 8LU, UK. Tel: +44 (0)20 7240 0856



# Contents

Volume 109, Number 1092

Reproduction of any of the papers published in this journal is not permitted without the written consent of the Editor.

**Editor-in-Chief**

Professor J L Stollery CBE DSc(Eng) FREng FAIAA  
HonFRaES

**Managing Editor**

C S C Male BSc(Eng) MRaES

**Production Editor**

W I I Read MA(Econ)

**News Editor**

T C Robinson BA

**Production Co-ordinator**

W J Davis BA

**Publisher**

Royal Aeronautical Society (RAeS)  
4 Hamilton Place  
London W1J 7BQ, UK  
Tel: +44 (0)20 7670 4300  
Fax: +44 (0)20 7670 4359  
e-mail: publications@raes.org.uk  
raes@raes.org.uk

<http://www.aerosociety.com>

The Royal Aeronautical Society  
is a registered charity: No 313708

**RAeS Chief Executive**

K D R Mans BA FRaES

The content does not necessarily express  
the opinion of the Council of the Royal  
Aeronautical Society.

**Advertisement Sales**

David Holmes, Advertisement Sales Director  
The Media Centre  
East Rudham  
King's Lynn  
Norfolk PE31 8RD  
United Kingdom  
Tel: +44 (0)1485 528020  
Fax: +44 (0)1485 528022  
e-mail: mcentre@aol.com

**Printer**

Manor Creative Limited  
7 and 8 Edison Road  
Eastbourne  
East Sussex  
BN23 6PT  
United Kingdom

ISSN: 0001-9240

**Published monthly**

**All papers are available to view  
at: [www.aerosociety.com](http://www.aerosociety.com)**

- R. Rudnik, P. Eliasson and J. Perraud**  
Evaluation of CFD methods for transport aircraft high lift systems 53
- B. Timmins**  
Life before and after implementation of an acoustic noise reduction enclosure 65
- V.I. Biryukov, S.A. Glazkov, A.R. Gorbushin,  
A.I. Ivanov and A.V. Semenov**  
Experimental investigation of the effect of nozzle shape and test  
section perforation on the stationary and non-stationary characteristics  
of flow field in the large transonic TsAGI T-128 Wind tunnel 75
- J. Dix, A.J. Saddington, K. Knowles and M.A. Richardson**  
Infra-red signature reduction study on a small-scale jet engine 83
- H. Tang and S. Zhong**  
2D numerical study of circular synthetic jets in quiescent flows 89
- Erratum: Greener by Design – The technology challenge J.E. Green** 98

Front cover: The ARA two stage transonic fan.