

# The **AERONAUTICAL** Journal



**M. Bühler and S.J. Newman**

The aerodynamics of the compound helicopter configuration.....111

**X. Mingchu and G. Wenying**

Rapid determination of aerodynamic sensitivity derivatives for subsonic wings.....121

**S.G. Mallinson, S.L. Gai and N.R. Mudford**

The boundary layer on a flat plate in hypervelocity flow.....135

**Volume 100 Number 994**

**April 1996**

# The AERONAUTICAL Journal

Volume 100 Number 994 April 1996



#### Editor

Professor J.L. Stollery, CBE, DSc(Eng),  
DIC, FCGI, FEng, Hon FRAeS

#### Managing Editor

B.F. Baldwin, BSc, MRAeS

#### Deputy Editor

S.M. Penney, BEng, Grad RAeS

#### Assistant Editor

C.S.C. Male, BSc(Eng), Grad RAeS

#### Publisher

The Royal Aeronautical Society  
4 Hamilton Place, London W1V 0BQ  
Tel: (+44) 171-499 3515  
Fax: (+44) 171-629 4009

#### RAeS Director

R.J. Kennett, FIMgt, FlntD, FCIT,  
FRSA, AFAIAA, FRAeS

#### Advertising agents

Chris Marot/Trevor Hornshaw  
Marot & Co  
3 Albion Buildings  
1 Back Hill, London EC1R 5EN  
Tel: (+44) 171-278 3686  
Fax: (+44) 171-837 2764

#### Printer

Manor Park Press  
Unit 7, Highfield Industrial Estate  
Edison Road, Hampden Park  
Eastbourne

#### Subscriptions

RAeS members: £23 a year  
Non-Members: please contact  
Publications Subscriptions Dept.  
Bradley Pavilions, Bradley Stoke North  
Bristol BS12 0BQ, UK  
Tel: (+44) 1454 620070  
Fax: (+44) 1454 620080

Subscriptions: £200 a year, post free  
Single copies, including back  
numbers: £25

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

The content does not necessarily  
express the opinion of the Council

The Royal Aeronautical Society is a  
registered charity

ISSN: 0001-9240

**PUBLISHED MONTHLY  
EXCEPT JUNE AND AUGUST**

## Aims and scope

The aims and scope of *The Aeronautical Journal* are intended to reflect the objectives of the 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 *Journal* include all those which are covered by the various Sections and Groups of the Society such as fluid mechanics and aerodynamics, propulsion, structures and materials, rotorcraft, astronautics and guided flight, dynamics and control, aeromarine technology, aviation medicine, air transport, airworthiness and maintenance, test flying, flight simulation, air law, management studies, history of aviation and manpowered aircraft. Thus 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. For further information on the submission of papers, see Guidelines for Authors, p 134.

## Editorial Advisory Board

*Chairman:* Dr E.W.E. Rogers

### Aerodynamics

Professor P.W. Bearman, *Department of Aeronautics, Imperial College*

### Aerospace medicine

Air Vice Marshal P. Howard, *formerly RAF Institute of Aviation Medicine*

### Air traffic control and simulation

G.C. Howell, *former Civil Aviation Authority chief scientist*

### Airworthiness

R. Ashford, *formerly Civil Aviation Authority and the European Joint Aviation Authorities*

### Avionics and systems

Professor D. McLean, *Department of Aeronautics & Astronautics, University of Southampton*  
P.A. Hearne, *formerly GEC-Marconi Avionics*

### Computational fluid mechanics and propulsion

Professor P. Stow, *Rolls-Royce*

### Flight testing, flight operations and air transport

Captain W.D. Lowe, *British Airways*

### Maintenance and airworthiness

G.B. Ratcliffe, *RAeS Airworthiness and Maintenance Committee*

### Noise, aeroelasticity and fluid mechanics

Professor E.G. Broadbent, *Department of Mathematics, Imperial College*

### Rotorcraft and structural dynamics

Professor D.E.H. Balmford, *formerly of Westland Helicopters*

### Space technology

R. Gibson, *Inmarsat*

### Structures and materials

T. Sharples, *Military Aircraft Division, BAe Defence*