

COMPUTATIONAL TECHNIQUES  
AND APPLICATIONS:  
CTAC-85

# COMPUTATIONAL TECHNIQUES AND APPLICATIONS: CTAC-85

Proceedings of the  
Computational Techniques and Applications Conference  
held at the University of Melbourne, Australia  
25-28 August, 1985

Edited by:

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## PREFACE

Following the very successful 1981 Conference on Numerical Solutions of Partial Differential Equations held at Queen's College, University of Melbourne, it was decided to hold a similar meeting in 1983, namely a Computational Techniques and Applications Conference (CTAC-83) in the Faculty of Engineering of the University of Sydney. At CTAC-83 the Computational Mathematics Group of the Applied Mathematics Division of the Australian Mathematical Society was formed, with its main function to oversee the organisation of biennial conferences in the CTAC series. This volume is the proceedings of the second such conference, CTAC-85, held in the Department of Mathematics of the University of Melbourne, Australia from 25th to 28th August, 1985.

There were six invited speakers who gave one-hour Keynote Lectures. They were Professor Bill Morton, Oxford University, England, "Characteristic Galerkin and Lagrange Galerkin Methods for Evolutionary PDEs", Dr. Pat Roache, Ecodynamic Research Associates Inc., Albuquerque, New Mexico, "The ELF Codes: Electrode Design for Lasers and Switches", Professor Bob Mattheij, Katholieke Universiteit, The Netherlands, "Stable Solution of Boundary Value Problems of Ordinary Differential Equations", Associate-Professor Graham de Vahl Davis, University of New South Wales, Australia, "Finite Difference Methods for Viscous Flow and Heat Transfer", Dr. Clive Fletcher, University of Sydney, Australia, "Finite Element Techniques for Slightly Viscous Flows", and Dr. Grant Steven, University of Sydney, "Constrained or Unconstrained Minimization and Penalty Methods in Finite Element Structural Analysis".

In addition, 48 research papers of one-half hour duration were presented. Refinements of various numerical techniques used in applications and experiences in applying these methods to solve practical problems were reported. These papers have been categorised into the following groups: techniques for partial differential equations, techniques for ordinary differential equations, fluid flow and heat transfer, tides and waves, flow through porous media, elasticity and structures, and miscellaneous.

A special mention must be made of the work done by the committee which organised the conference so efficiently. Thanks also go to the various organisations which assisted financially and otherwise — they are listed separately.

Finally, our personal thanks go to Drs. Arjen Sevenster (Mathematics Editor), John Butterfield (Technical Editor) and Clive Ewing (Promotions Department) of Elsevier Science Publishers B.V. in Amsterdam, for their assistance in arranging the publication of this book.

John Noye  
The University of Adelaide

Robert May  
Royal Melbourne Institute of Technology

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**COMPUTATIONAL TECHNIQUES AND APPLICATIONS CONFERENCE  
CTAC-85**

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**THE COMPUTATIONAL MATHEMATICS GROUP  
DIVISION OF APPLIED MATHEMATICS  
AUSTRALIAN MATHEMATICAL SOCIETY**

The proposal to form a Computational Mathematics Group as a Specialist Group of the Division of Applied Mathematics was initiated by the committee who organised the Computational Techniques and Applications Conference (CTAC-83) held in Sydney in 1983. This volume forms the proceedings of CTAC-85, the second in the CTAC series.

The second meeting of the Computational Mathematics Group of the Division of Applied Mathematics of the Australian Mathematical Society took place on August 30 during CTAC-85. At this meeting the second committee of the Computational Mathematics Group was elected. It consists of:

**Chairman:** Dr. B.J. NOYE

*Department of Applied Mathematics  
The University of Adelaide  
Adelaide  
South Australia  
Australia*

**Secretary:** Dr. C.A.J. FLETCHER

*Department of Mechanical Engineering  
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*Department of Mathematics*  
*Royal Melbourne Institute of Technology*  
*Victoria*  
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**Ex Officio:** Chairman  
Division of Applied Mathematics  
Australian Mathematical Society  
(presently Professor J.R. BLAKE  
*Mathematics Department*  
*The University of Wollongong*  
*New South Wales*  
*Australia*)

The major responsibility of this Group is the organisation of the biennial *Computational Techniques and Applications Conferences* which are intended to foster communication between the users of computational mathematics who work in a wide range of disciplines.

The next such conference (CTAC-87) will be held in Sydney, Australia, in August 1987. The Convenor will be Dr. C.A.J. Fletcher, Department of Mechanical Engineering, The University of Sydney, Sydney, New South Wales 2006, Australia. All enquiries concerning CTAC-87 should be addressed to him.

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