

**Proceedings of the
Seventh International Conference on
Computational Structures Technology**

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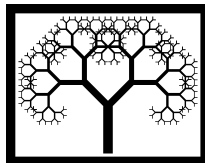
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B.H.V. Topping, J. Muylle, P Iványi, R. Putanowicz and B. Cheng

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Edited by
B.H.V. Topping and C.A. Mota Soares



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Preface

This volume comprises the extended abstracts of contributed papers presented at The Seventh International Conference on Computational Structures Technology (CST 2004) held at Lisbon, Portugal, from 7 to 9 September 2004. The full papers from the conference are available on the accompanying CD-ROM. The CST conference series began in Edinburgh during 1991. The 2004 conference was held concurrently with The Fourth International Conference on Engineering Computational Technology (ECT 2004). The venue for both the 2004 conferences was the National Civil Engineering Laboratory (LNEC) in Lisbon.

The special sessions included in this volume of Proceedings are:

- Modelling and Simulation of Adaptive Beams and Bimorphs
organised by Professor A. Benjeddou and Professor C.M. Mota Soares
- Modelling and Simulation of Adaptive Plates and Shells
organised by Professor A. Benjeddou and Professor C.M. Mota Soares
- Modelling and Simulation of Composite Structures
organised by Professor A. Benjeddou and Professor C.M. Mota Soares
- Computational Models for Multilayered Structures
organised by Professor E. Carrera
- Failure Analysis for Composites: Engineering Approaches and Highly Sophisticated Models
organised by Professor R. Rolfes and Dr Ing J. Teßmer
- Material Models and Finite Element Analysis
organised by Dr M.H.B.M. Shariff
- Formulations and Computational Models for Finite Strains
organised by Dr J. Plešek
- Non-Linear Dynamics of Structures and Mechanical Systems
organised by Dr P.L. Ribeiro
- Biomechanical Simulations
organised by Professor A. Eriksson
- Computational Stochastic Structural Analysis and Optimization
organised by Professor K. Marti and Professor G.I. Schuëller

- Differential Quadrature, Generalised Methods and Related Discrete Element Methods
organised by Professor C.N. Chen
- Stability of Inelastic Deformation Processes
organised by Professor I. Doltsinis and Professor V.D. da Silva

We are particularly grateful to the organisers of these special sessions.

The following sessions are also included in this volume:

- Meshfree and Associated Methods
- Static and Dynamic Re-analysis
- Structural Analysis and Graph Theory
- Finite Element Analysis, Modelling and Solution Methods
- Boundary Element Methods
- Steel Structures
- Shakedown Analysis
- Reinforced Concrete Structures
- Composite Structures
- Masonry Structures
- Homogenisation: Techniques and Applications
- Concrete Modelling
- Timber Structures
- Tension Structures
- Analysis and Design of Building Structures
- Bridge Engineering
- Dynamics and Vibration of Structures
- Inverse Analysis, Damage Detection, Acoustic Emission & Signal Processing
- Buckling and Stability Problems
- Thin Walled Structures
- Plates: Modelling and Analysis
- Shells: Modelling and Analysis
- Earthquake and Seismic Engineering
- Crashworthiness of Structures
- Metal Forming: Optimization and Control
- Structural Optimization
- Topology Optimization

Other papers presented at the conferences in 2004 are published as follows:

- *The Invited Lectures from CST 2004 are published in:*
Progress in Computational Structures Technology, B.H.V. Topping and C.A. Mota Soares (Editors), Saxe-Coburg Publications, Stirling, Scotland, 2004.
- *The Invited Lectures from ECT 2004 are published in:*
Progress in Engineering Computational Technology, B.H.V. Topping and C.A. Mota Soares (Editors), Saxe-Coburg Publications, Stirling, Scotland, 2004.
- *The Contributed Papers from ECT 2004 are published in:*
Proceedings of the Fourth International Conference on Engineering Computational Technology, B.H.V. Topping and C.A. Mota Soares, (Editors), (Book of Abstracts and CD-ROM), Civil-Comp Press, Stirling, Scotland, 2004.

These conferences could not have been organised without the help and support of many people. We would like to thank Professor Cristovão Mota Soares (IST) for all his kind help during the planning and organisation of these conferences. No trouble, task or problem was too great for him and we are grateful for his perseverance. We are also grateful to Professor Carlos Pina (LNEC) who so kindly helped us with the logistics of using the LNEC conference facilities.

We are grateful for Jelle Muylle (Civil-Comp Press) for designing and organising this and the other three volumes of conference proceedings (listed above). In addition, his development of the conference IT systems made sure that we could keep everything on track during the months of preparation of these volumes. The task was particularly onerous this year with more than twice the number of papers included in the four volumes than was originally anticipated. Once again we would like to thank Judy Tait (Civil-Comp Press) for her organisational skills, which were greatly appreciated.

We both wish to acknowledge and express our gratitude to the conference sponsors:

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- Instituto Superior Tecnico, Lisbon,
- National Laboratory for Civil Engineering (LNEC), Lisbon,
- International Journal of Computers & Structures (Elsevier Science Ltd), and
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