

**Civil-Comp Proceedings: 96**

**Proceedings of the  
Thirteenth International Conference on  
Civil, Structural and Environmental Engineering Computing**

## **Civil-Comp Proceedings:**

### **Proceedings of the Second International Conference on Parallel, Distributed, Grid and Cloud Computing for Engineering**

*Edited by: P. Iványi and B.H.V. Topping*

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*Edited by: B.H.V. Topping, J.M. Adam, F.J. Pallarés, R. Bru and M.L. Romero*

### **Proceedings of the Seventh International Conference on Engineering Computational Technology**

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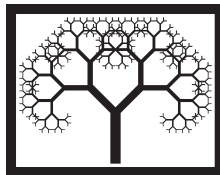
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Thirteenth International Conference on  
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*Edited by*

**B.H.V. Topping and Y. Tsompanakis**

*Including special sessions organised by*

**Z. Dimitrovová, J. Pombo, P. Teixeira, J.T. Kim, L.F. Costa Neves,  
J.G.S. da Silva, P.C.G. da S. Vellasco, J.W. Bull, L. Lima, A. Dusi,  
J. Náprstek, L. Andersen, A. Elhami, K. Marti, T. Vietor, G.I. Schuëller,  
V. Pomezanski, R.Y. Xiao, M. Domaneschi and M. Hartnett**



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# Preface

This volume comprises the summaries of contributed papers presented at “The Thirteenth International Conference on Civil, Structural and Environmental Engineering Computing” (CC 2011) held in Chania, Crete, Greece from 6-9 September 2011. The full papers from the conference are available on the accompanying CD-ROM. The CC conference series began in London in 1983. The CC 2011 conference was held concurrently with “The Second International Conference on Soft Computing Technology in Civil, Structural and Environmental Engineering” (CSC 2011).

The special sessions included in this volume of Proceedings are:

- Railway Research: Vehicle Track Dynamic Analysis and Related Environmental Problems  
*organised by Z. Dimitrovová, J. Pombo and P. Teixeira*
- Sustainable and Healthy Building Technology  
*organised by J.T. Kim*
- Steel and Concrete Composite Structures  
*organised by L.F. Costa Neves, J.G.S. da Silva and P.C.G. da S. Vellasco*
- Finite Element Analysis of Masonry  
*organised by J.W. Bull*
- Design of Buildings: Structural Concepts and Modelling  
*organised by L.F. Costa Neves and L. Lima*
- Base Isolation and Energy Dissipation  
*organised by A. Dusi*
- Dynamics, Vibration and Stability  
*organised by J. Náprstek*
- Offshore Wind Turbines  
*organised by L. Andersen*
- Probabilistic Approaches to Structural Mechanics  
*organised by A. Elhami*
- Optimal Structural Design and Control under Stochastic Uncertainty  
*organised by K. Marti, T. Vietor and G.I. Schuëller*
- Topology and Shape Optimization  
*organised by V. Pomezanski*
- Computational Modelling and Analysis on Structures under Extreme Loading  
*organised by R.Y. Xiao*
- Nuclear Power Plant and Related Analysis  
*organised by M. Domaneschi*
- Modelling of Tidal Flows and Material Transport  
*organised by M. Hartnett*

We are particularly grateful to the special session organisers.

The following sessions are also included in this volume:

- Geographical Information Systems and Computer Aided Design Software
- Imaging Techniques
- Mesh Generation
- High Performance Computing
- Elasto-Plastic Analysis
- Materials Modelling
- Porous Materials
- Meshless Methods
- Isogeometric Analysis
- Developments in Finite Element Technology and Modelling
- Boundary Element Method
- Discrete Element Methods
- Particle Methods
- Computational Fluid Dynamics
- Application of Optimization Models in Civil and Structural Engineering
- Design Optimization and Sensitivity Analysis
- Reduced Order Models
- Construction Engineering
- Recycled Aggregate Concrete
- Water Resources Management
- Energy Resources
- Aluminium Structures
- Timber Engineering
- Reinforced Concrete Modelling
- Seismic Structural Engineering
- Non-Destructive Testing, Damage and Identification
- Bridge Engineering
- Tensegrity Structures
- Skeletal and Surface Structures
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- Pavement Engineering
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- Soil-Structure Interaction
- Seismic Geotechnical Engineering
- Tunnelling
- Cracking and Fracture Analysis
- Composite and Functionally Graded Materials
- Composite Plates and Panels
- Carbon Nanotubes
- Biomechanics

Other papers presented at the conferences in 2011 are published as follows:

- *The Invited Review Lectures from CC 2011 and CSC 2011 are published in:*  
Computational Technology Reviews, Volume 4, Saxe-Coburg Publications, Stirlingshire, Scotland, 2011.

- *The Invited Lectures from CC 2011 are published in:*  
Civil and Structural Engineering Computational Technology, B.H.V. Topping and Y. Tsompanakis, (Editors), Saxe-Coburg Publications, Stirlingshire, Scotland, 2011.
- *The Invited Lectures from CSC 2011 are published in:*  
Soft Computing Methods for Civil and Structural Engineering, Y. Tsompanakis and B.H.V. Topping, (Editors), Saxe-Coburg Publications, Stirlingshire, Scotland, 2011.
- *The Contributed Papers from CSC 2011 are published in:*  
Proceedings of the Second International Conference on Soft Computing Technology in Civil, Structural and Environmental Engineering, Y. Tsompanakis and B.H.V. Topping, (Editors), (Book of Summaries with a CD-ROM of full-text papers), Civil-Comp Press, Stirlingshire, Scotland, 2011.

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