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Mechanics and Computation, 10-12 September 2007, Cape Town, South Africa

Recent Developments in Structural Engineering, Mechanics and Computation

Edited by

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Preface

The Third International Conference on Structural Engineering, Mechanics and Computation (SEMC 2007) took place in Cape Town, South Africa, from 10 to 12 September 2007. The first conference of the series was held in 2001, and the second followed in 2004. The series aims at bringing together from around the world academics, researchers and practitioners in the broad fields of structural mechanics, associated computation and structural engineering, for the purposes of reviewing recent achievements in the advancement of knowledge and understanding in these areas, sharing the latest developments, and addressing the challenges that the present and the future pose. Attendance at these conferences has grown from about 200 in the inaugural year to almost double that figure in 2007, with more than 50 countries from around the world having been represented at the most recent conference. That the principal aim of the series was amply fulfilled at SEMC 2007 is evidenced by the large number of papers presented, the wide spectrum of topics covered, the impressive range of nationalities of the participants, and the intensity of the discussions that went on in the numerous sessions of the conference.

These Proceedings contain over 360 papers that were presented at the Conference. The papers appear in 38 sections. The first two sections feature the keynote and invited papers, while the rest of the sections pertain to the various topics that were covered by the Conference. While most of the papers clearly identify with specific and quite distinct topics, some papers will inevitably qualify for categorisation under more than one topic, owing to the overlapping nature of many issues. The topics themselves belong to a number of broad themes spanning the scope of the Conference, namely: (i) structural mechanics (vibration, dynamics, impact response, buckling, seismic response, soil-structure interaction, etc); (ii) mechanics of materials (elasticity, plasticity, creep, shrinkage, transport processes, fatigue, fracture, damage and deterioration phenomena); (iii) numerical methods, simulations and computational modelling; (iv) practical aspects of the analysis, design, construction and maintenance of structures. The range of topics also reflects, on the one hand, the different types of structures and structural systems encountered in practice (shells, plates, frames, bridges, buildings, lightweight structures, space structures, foundation structures, etc), and on the other hand, the wide range of structural materials that are now available (steel, concrete, timber, masonry, glass, ceramics, composites, fibre-reinforced polymers, aluminium, special alloys and smart materials).

Recent years have seen a shift in design philosophy towards prolonging the service life of infrastructure, and designing for long-term performance of structures. A significant number of papers in these Proceedings reflect this trend, and focus on issues of damage detection, structural health monitoring, structural assessment, repair, strengthening and retrofitting. Now and again events around the world, both natural and man-made, continue to highlight the need for a better understanding of the response of structures to extreme loading conditions such as fire, earthquakes, blasts, explosions, tsunamis and storms. It is therefore proper that a considerable number of papers in these Proceedings are concerned with designing for fire and earthquake resistance. It is encouraging to note that significant strides are being reported in the development of new materials and technologies that are better suited to resisting these hazards, and better able to meet the demands for longer service lives of structures. Thus one will find several papers dealing with high-performance concrete, fibre-reinforced alternatives, stainless steel, special alloys and smart composites, among many recent innovations.

For the convenience of the reader, two versions of each paper are available. The short paper of length 2 pages is the version that appears in the printed book, and is intended to be a sufficiently informative summary of the full paper. Full papers are carried on the accompanying CD-ROM, included on the inside of the back cover of the book.

All papers that were submitted for the SEMC 2007 International Conference were subjected to peer review, and the Proceedings contain only those papers that were accepted following this process. The review of manuscripts was undertaken by members of the International Advisory Board and other identified experts, each acting independently. The assistance of all reviewers in enhancing the standard of the Proceedings is gratefully acknowledged.

Special acknowledgements are due to the following organizations, who were the principal sponsors of the SEMC 2007 International Conference:

- The Joint Structural Division of the South African Institution of Civil Engineering and the Institution of Structural Engineers
- The Southern African Institute of Steel Construction
- The Cement and Concrete Institute of South Africa
- The National Research Foundation of South Africa

Last but not least, I would like to thank the Authors themselves, for making available the vast wealth of information contained in these Proceedings. It is hoped that readers will find the Proceedings an invaluable resource.

A. Zingoni
Editor

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