

Preface

During the SHMII4 conference in July 2009 in Zurich, Switzerland, I had a fruitful discussion with Professor Farhad Ansari, and later with Professor Urs Meier, where we came to the conclusion to organise a conference in the Middle East region. Our motivation was that the region as a whole, but especially UAE is enjoying an unprecedented construction boom. Major projects are being undertaken in areas related to airport and infrastructure development as well as off-shore construction. Growth in tourism has led a large number of real estate developers, both local and foreign, investing in hotels, resorts and commercial projects. More sophisticated structures are regularly being designed and built while existing structures keep aging. Therefore, innovative sensors and communication technology, data acquisition systems for inspection and assessment as well as structural health monitoring on one hand, and sophisticated techniques for rehabilitation of civil structures on the other hand, become viable.

Following our discussions in Zurich, I decided to share my views with the presidents and executive members of the International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII) and International Institute of FRP in Construction (IIFC). I was glad to have their full support for our project.

The SMAR 2011 conference is the first Middle East Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures held in Dubai, from 8 to 10 February 2011. Co-organized by Empa, the Swiss Federal Laboratories for Materials Science and Technology and AUD, the American University in Dubai, the conference aimed at bringing together from around the world academics, researchers, builders and building authorities in the broad area of testing and monitoring technologies, in structural modelling and assessment methods, in the application of advanced materials for structural rehabilitation and allied fields, to review and discuss the recent achievements, share the latest developments in these areas, and address the challenges that the future poses. Furthermore, the conference will provide a platform for exploring the potential of international cooperation.

SMAR 2011 is the first conference located in the Middle East sponsored jointly by the International Society for Structural Health Monitoring of Intelligent Infrastructure (ISHMII) and International Institute of FRP in Construction (IIFC).

The proceedings contain a total of 168 Papers written by authors from around 30 Countries worldwide. The contributions include six Keynote Papers. In line with the aims of the SMAR2011, and as may be seen from the List of Contents, the papers cover a wide range of topics under a variety of themes. There is a healthy balance between papers of a theoretical nature, concerned with various aspects of computational issues, and those of a more practical nature.

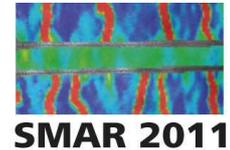
The abstracts of the papers are included in this booklet and the attached CD-Rom provides the full papers. The papers are in the following areas of monitoring, assessment and rehabilitation of civil structures:

- Structural Health Monitoring
- Performance and damage assessment
- Damage control, repair and strengthening, fire protection
- Durability of material systems and structures as related to harsh environments
- Practical applications and case studies
- Concrete material properties

I would like to thank all authors for preparing their work towards this compilation, which will undoubtedly serve as a useful reference to practitioners, researchers, students and academics, and allied disciplines. Special thanks are due to Members of the International Scientific Committee, who reviewed the papers carefully. The support of the Sponsoring Organisations is gratefully acknowledged. I am indebted to my colleagues in the Local Organising Committee, especially Professor Elias Saqan, Chair of the Local Organising Committee, for the hard work they put into the preparations for the conference.

Thanks to the Empa conference team, Bernadette Havranek, the conference manager, for her tireless efforts and quick responses to many demands of the conference, Reinhard Bischoff and Rouven Christen for their support regarding informatics issues, and Anton Koster for designing the graphic style of the printed matter.

Masoud Motavalli
Chair, SMAR 2011
February 2011

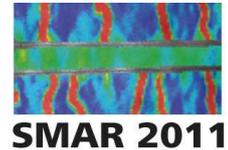


Foreword

The Department of Civil Engineering at the American University in Dubai (AUD) is very pleased to co-organize with Empa (Swiss Federal Laboratories for Materials Science and Technology) the First Middle East Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures (SMAR 2011). This joint effort is highly regarded on both sides of the organizing institutions because it gives a platform for researchers from both East and West to discuss latest research on two close subjects, namely, structural health monitoring and rehabilitation, which are of utmost importance to an area which has witnessed a huge construction boom in a relatively short period of time.

Choosing Dubai as the conference venue makes perfect sense. Dubai has seen in the past decade an unprecedented growth in the construction industry. Today, Dubai is the home of many structures that are holding world records in several categories. Dubai is the home of the world's tallest man-made building. Burj Khalifa is the world's tallest tower with a total height of 828m above ground and can be seen from distances as far as 60 miles away. Dubai is also home of many structures that are considered iconic by all means. Buildings with unusual shapes and sizes are found in Dubai. Dubai has also seen a huge growth in roads and bridge networks and the size of its infrastructure dramatically increased. These structures were designed and built based on the assumption that the existing design codes take into consideration the unusual size and shape effects. While most of these unusual structures have been already successfully designed and built, their long term performance is yet to be monitored and studied. Dubai is once considered to be the world's largest civil engineering lab. There is a huge wealth of structural health monitoring data that can be collected from Dubai. Such data will play an important role in future design codes by verifying design assumptions and the adequacy of design codes for unusual structures. Structural monitoring is not done only for the sake of monitoring but to facilitate assessment and rehabilitation, if needed. The harsh weather encountered in Dubai coupled with the speed of construction which was normal during the construction boom and may have led to design and construction errors requires efficient methods for assessment and strengthening. SMAR 2011 is unique in bringing structural health monitoring and rehabilitation under one umbrella.

First Middle East Conference on Smart Monitoring,
Assessment and Rehabilitation of Civil Structures
8 – 10 February 2011, Dubai, UAE



I would like to thank Professor Masoud Motavalli, conference chairman, for initiating and believing in this cooperation between Empa and AUD. I also would like to thank the Scientific Committee Members for their support during the review of the papers and for ISHMII and IIFC for supporting SMAR 2011. I also thank the local organizing committee members for their support and help, Ms. Bernadette Havranek from Empa and Ms. Pameline Martin from AUD for their meticulous coordination to ensure a job well done, and AUD staff who contributed to preparing for the conference. Finally, the local organizing committee extends a warm welcome to all the delegates and wishes them a successful conference and a good stay in Dubai and AUD.

Elias Saqan

Chair of the Local Organizing Committee

February 2011