

Volume I



Progress on Safety of  
**Structures in Fire**  
结构火灾安全进展

Proceedings of the 8<sup>th</sup> International Conference on Structures in Fire

Edited by

Guo-Qiang LI

Venkatesh K. R. KODUR

Shou-Chao JIANG

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Guo-Biao LOU



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第八届结构火灾安全国际会议论文集

June 11-13, 2014, Shanghai, China

Volume 1



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## PREFACE

Structural fire safety has raised growing concerns in the design of infrastructures. The "Structures in Fire" (SiF) specialized workshop series was conceived in the late 1990's and the "First International SiF workshop" was held in Denmark in 2000. The workshop was then held every two years until 2008 with the title changed from workshop to conference. Under this new framework the 5th-7th International Conference on SiF were held in Singapore (2008), USA (2010) and Switzerland (2012), respectively. The main mission of SiF conferences is to provide an opportunity for researchers and engineers to share their research, technology and expertise with their peers at an international forum.

Following the great success of previous workshops and conferences, Tongji University was selected to host the 8th International Conference on Structures in Fire SiF'14 in Shanghai on June 11-13, 2014.

The response to call for papers for SiF'14 was overwhelming and the Organizing Committee received more than 280 abstracts for this year's conference. As a first attempt for parallel sessions, a total of 155 papers from 29 countries were selected for publication in the conference proceedings. The papers are subdivided into 8 chapters with themes including *Applications of Structural Fire Safety Engineering, Steel Structures, Concrete Structures, Composite Structures, Timber Structures, Fire Protection Materials, Numerical Modeling, and any other topics*. It is hoped that the high quality of the technical papers presented in this proceedings will enable researchers and practitioners to develop greater insight of structural fire engineering, so that safer structures will be designed for fire-resistance.

We would like to thank all the members of the Scientific Committee for reviewing the abstracts within an incredibly short period of time, in particular the support of Professors Bin Zhao, Kang Hai Tan, Mario Fontana, Asif Usmani, Guo Qiang Li and Paulo Vila Real, taking the burden of the track leaders for the Scientific Committee. Our sincere appreciation must be presented to the SiF Steering Committee for guiding the review process and for providing direction to the successful organization of this conference. Our sincere thanks also go to all authors—the quality of the book is just the corollary of the high standard of their contributions and research activity. Finally, we would like to appreciate the effort and extraordinary support provided by all the members of the Organizing Committee, especially the staff at Tongji University.

**Guo-Qiang LI**  
*Chairman of Organizing Committee*  
**Venkatesh K.R. KODUR**  
*Chairman of Scientific Committee*

Shanghai, June 2014

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