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PREFACE

Structural fire engineering is a relatively new field for designers and building control authorities. However there is a growing acceptance that the fire-resistant design of buildings should be based on a logical analysis of their performance in the context of realistic fire scenarios, determined from an approach to safety which considers both the statistics of risk and the severity of possible outcomes. Research in this field has experienced very rapid growth since the mid-1990s, particularly in Europe, and there are now many examples of major structures for which structural fire engineering has been incorporated in the design process together with the more traditional fire safety concepts.

The papers published in this volume were presented at the second conference entitled *Applications of Structural Fire Engineering*, which was held at the Czech Technical University in Prague in April 2011. They cover topics across a wide range of research and advanced practice in structural fire engineering, and leading research groups in the field from Europe and world-wide are represented. A declared theme of the conference was the use of advanced modelling, and this is reflected in at least two thirds of the papers. The types of structural systems covered include steel, concrete, composite and timber framed buildings, as well as thermal modelling of fire scenarios. In order to gain acceptance with national and local fire regulation authorities, academic research findings must be used to develop both powerful computational tools and the simplified methods which are more accessible to non-specialists. The latter are particularly suitable for implementation in codes of practice; the structural Eurocodes have initiated this process by including simple, though performance-based, calculation procedures for fire resistance of structural elements which can be used either manually or in spreadsheets. These are necessarily restricted in scope, but mark a very significant psychological move away from the traditional prescriptive rules for fire protection which still dominate in design practice. Much of the work presented here is aimed at evaluating and enhancing these lower-level procedures. In the longer term it seems inevitable that fire-resistant design, particularly of large, complex buildings, will be based on thermo-structural "whole-structure" modelling in realistic fires. The development of components of these modelling tools is well represented in these articles. Although large-scale fire testing is extremely expensive, some testing at realistic scale continues, and these are providing invaluable evidence against which both the simplified and advanced computational approaches can be evaluated. The issue of robustness, or avoidance of disproportionate collapse as a result of discrete structural failures, is increasing in importance. The risks were amply illustrated by the progressive collapse of several buildings of the World Trade Center in New York in 2001 after multi-storey fires. It is clearly desirable that, in future, large buildings are designed so that failures due to unforeseen circumstances are arrested before a catastrophic sequence occurs.

This volume will be of interest both to active researchers and to those (such as regulatory authorities, fire safety engineers and structural designers) with an interest in the movement towards practical performance-based design of structures against fire.

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