EDITORIAL

Fire causes a significant loss to life and property, this is why the fire resistance of buildings is one of the main considerations for structural designers. The behaviour of structures exposed to fire is usually described in terms of the concept of fire resistance, which is the period of time under exposure to a standard fire time-temperature curve at which some prescribed form of limiting behaviour occurs. In performance-based design, this limiting behaviour may be defined either as a real structural collapse or as a failure of integrity, which would allow fire spread to occur but is more usually defined in terms of a deflection limit. The recent design codes, such as Eurocodes, have taken a step toward full performance-based design by allowing designers to treat fire as one of the basic design limit states, taking account of: (1) non-uniform heating due to partial protection, which may be inherent in the framing system or specially applied, (2) the level of loading at the fire limit state, using partial safety factors lower than those used for ultimate limit states because of the relative improbability of such accidental combinations, and (3) realistic stress-strain characteristics of structural materials at elevated temperatures. The main limitation of these codified approaches is that they are based on the behaviour under test of isolated simply supported members, usually heated according to the standard ISO834 time-temperature curve. In real buildings, the structural elements form part of a continuous assembly and building fires often remain localized, with the fire-affected region of the structure being subjected to significant restraint from the cooler areas surrounding it. The real behaviour of these structural elements can therefore be very different from that indicated by the standard furnace tests.

As the field is crucial for building safety, and requires close co-operation between research communities from all over the world to share their knowledge and experience, this special issue aims to provide a forum for publication of original peer-reviewed articles on new research findings, and other recent developments in structural fire engineering. The issue consists of four papers which investigate the thermal and structural behaviour of steel and concrete structures in fire. It is freely available to scientists, scholars, teachers, engineers and students worldwide, and I hope that it will become a reliable source of information on current developments in the field.

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