

STATE-OF-THE-ART IN FIRE MODELLING

Institution of
**MECHANICAL
ENGINEERS**

04 June 2018

Institution of Mechanical Engineers, London

PRESENTED BY:

Stephen Welch, Senior Lecturer

BRE Centre for Fire Safety Engineering, The University of Edinburgh



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Lecture
Thermofluids Group

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04 June 2018, Institution of Mechanical Engineers, London

SIMULATION TOOLS FOR MODELLING FIRES FACILITATE THE PREDICTION AND UNDERSTANDING OF THEIR IMPACT ON STRUCTURES AND HUMAN OCCUPANTS.

The hazardous conditions in post flashover fires, and requirement to address fire development in the large/complex spaces typical of modern architecture, present new challenges, including underventilated combustion, fire spread and new materials. Moreover, due to the inherent complexity of fire and fire-structure interactions, together with the unpredictable nature of human interventions, deterministic models will ultimately fail.

New approaches are now under development which permit a more generalised treatment of the fire boundary condition and associated thermo-mechanical response. These include thermal analysis models which consider the variability in fire protection materials, representations of travelling fires which are tied to the fundamental fire physics, and the idea of sensor-linked fire models which respond to the changing fire conditions in real time. This is being made possible in part by means of modern computing tools implemented on High Performance Computing platforms, together with full scale validation experiments.

The lecture, organised by the Thermofluids Group will give an overview of current state-of-the-art in fire modelling techniques, illustrated by a variety of application examples.

PROGRAMME

17:30 Registration and refreshments

18:00 Lecture begins

19:00 Q&A session

19:30 Lecture ends

FOR MORE INFORMATION:

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Stephen has a PhD in combustion (diesel engine soot emission prediction) and over 20 years of experience in fire research and teaching. He worked for a decade at BRE's Fire Research Station, including full-scale fire tests at BRE Cardington, before joining the BRE Centre for Fire Safety Engineering at the University of Edinburgh in 2004. His main research interests have been in the development and validation of computer modelling methods for fire-related problems in building and transport applications, spanning fluid dynamics, combustion, toxic species, smoke, heat transfer and human behaviour. His current research includes generalised methods for structural fire safety engineering encompassing "travelling fires" in OpenSees (RFCS TRAFIR project), dynamics and simulation of travelling and post-flashover fires using High Performance Computing (EPSRC UKCTRF/Real Fires for Safe Design of Tall Buildings) and real-time emergency management techniques exploiting sensor-linked model for fire and egress (FireGrid).