ABOUT THE COURSE

The Lecture includes Structural Response under blast loading. The fundamental of blast loading such as the Principle of the scaling law, blast profile are introduced. The basic design principles in the relevant design guidance such as SCI (1999), TM5-1300(1990) will be also introduced, which include numerical method (classical solution and incremental solution) to solve the structural response; The way to assess the structural response and human response using Iso-Damage diagrams (Pressure-Impulse diagrams); design procedure for steel and reinforced concrete members under the blast loading.

Fire

This syllabus also includes Structural Response under Fire. Basics of fire physics and the engineering idealisations made to characterise fire induced "loading" on structural systems. Detailed description of the key features of behaviour of common engineering materials (primarily steel and concrete) under high temperatures and the key responses expected when simple structural systems are exposed to fire. Traditional methods of design to ensure adequate fire resistance and recent trends towards performance based engineering in a probabilistic framework.

On completion of the course you will be able to apply a sound knowledge of various technologies for checking response of structures under fire and blast loading.

WHO SHOULD ATTEND

The course is intended for Engineers, Operations' managers, Applied Scientists and Technologists interested in design & structure under blast loading. Engineers, managers and scientists involved in design, assessment and management of a wide range of engineering structures will also benefit from this course.

COST

The registration fee of the workshop will be £650 + VAT (UK only) which includes course notes and lunches. You should make your own arrangements for accommodation.

PAYMENT

Payments can be made by cheque (made payable to ASRANet Ltd.), cash or bank transfer. Please enquire for details.

VENUE

TBC

NOTE

Please do not make your travel arrangements until you receive an Invoice from us.

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Engineering Structures Under Fire & Blast

10-11 September 2018
London, UK

ASRANet

PROGRAMME

Monday 10th September 2018

09.00 – 10.30	Lecture 1: Effects of blast loading on material characteristics *Dr Feng Fu*
10.30 - 10.45	*Break*
10.45 - 12.15	Lecture 2: Blast response analysis using closed form, approximated simplified methods *Dr Feng Fu*
12.15 - 13.30	*Lunch*
13.30 - 15.00	Lecture 3: Numerical modelling for the analysis of structures under blast and pressure impulse diagrams *Dr Feng Fu*
15.00 – 15.30	*Break*
15.30 - 17.00	Lecture 4: Codified Design examples for blast resistant structures. *Dr Feng Fu*

Tuesday 11th September 2018

9.00 - 10.30	Lecture 5: Fundamentals of fire physics and heat transfer *Dr Adam Jan Sadowski*
10.30 - 10.45	*Break*
10.45 - 12.15	Lecture 6: Fire growth and characterization as a 'load' in EN 1991-1-2 *Dr Adam Jan Sadowski*
12.15 - 13.30	*Lunch*
13.30 - 15.00	Lecture 7: Mechanical properties of steel and concrete under elevated temperatures *Dr Adam Jan Sadowski*
15.00 - 15.30	*Break*
15.30 - 17.00	Lecture 8: Prescriptive fire design of steelwork according to EN 1993-1-2 *Dr Adam Jan Sadowski*

LECTURE CONTENT

Lecture 1: Effects of blast loading on material characteristics. This lecture begins with an overview of the blast effects on structures. The lecture then proceeds with detailed discussion on the blast loads. The Principle of the scaling law, blast profile are introduced. Material behaviour of structural members at high strain rate will be covered

Lecture 2: Blast response analysis using closed form, approximated simplified methods. This lecture deals with the calculation of the blast response of structures using simplified methods, namely single-degree-of-free (SDOF) method for the overall response predictions; analysis of element response using energy method; analysis of element response using equivalent SDOF method.

Lecture 3: Numerical modelling for the analysis of structures under blast and pressure impulse diagrams. This lecture deals with the analysis of the blast response using numerical simulation approach. The way to assess the structural response and human response using Iso-Damage diagrams (Pressure-Impulse diagrams) will also be covered.

Lecture 4: Codified Design examples for blast resistant structures. The detailed example of Design of element in steel or reinforced concrete under blast will be demonstrated.

Lecture 5: Fundamentals of fire physics and heat transfer. This lecture provides an overview of fire science and fire safety engineering in order to set the subsequent material in its proper context. The fundamentals of heat transfer, including conduction, convection and radiation, are introduced, as an understanding of these is central to any fire safety design.

Lecture 6: Fire growth and characterization as a 'load' in EN 1991-1-2. Important stages in the growth of a fire are discussed along with methods of quantifying them, particularly when a fire reaches the stage where it becomes a significant threat to the stability of the structure. In particular, the lecture discusses the history and limitations of the 'standard' fire curve, the 'hydrocarbon' fire curve, and the 'parametric' or 'natural' fire curve in EN 1991-1-2.

Lecture 7: Mechanical properties of steel and concrete under elevated temperatures. These widespread structural materials suffer a marked degradation in their mechanical properties due to the action of a fire. The focus will be on steel, as it is particularly susceptible to thermal attack and requires carefully fire protection.

Lecture 8: Prescriptive fire design of steelwork according to EN 1993-1-2. This lecture builds on the fundamentals introduced in the three preceding lectures to give an introduction to prescriptive design for steel according to EN 1993-1-2.

journals and 4 books of international renowned publishers. He published more than 30 technical papers and two text books;

LECTURER CV'S

Dr Feng Fu Ph.D. MBA, CEng, MIStructE, MICE, MASCE, FHEA is a Chartered Structural Engineer, Member of Institution of Structural Engineers, Member of Institution of Civil Engineers and Member of American Society of Civil Engineering. He is also a committee member of Disproportionate Collapse Mitigation of Building Structure Standards and Blast Protection of Building Standard, American Society of Civil Engineers. He is the member of editorial Board, Advances in Computational Design, An International Journal.

He is currently a Lecturer in Structural Engineering in City University following his work at university of Bradford for the same position. Prior to that, he worked for several world leading consultancy companies. During his industrial practice, he was involved in the design of extensive prestigious construction projects worldwide, such as Shard, the currently tallest building in Europe and gained extensive experience in designing buildings under extreme loadings such as blast and fire and the knowledge in designing building to prevent progressive collapse.

He has extensive research experience in the area of progressive collapse, structural fire analysis and blast analysis of tall buildings and long span structures. He also conducted his research in the area of Tensegrity structures and steel and composite structures. He specialized in advanced numerical modelling and developed several modelling programs using different languages. He is currently supervising 4 Ph.D. students. He is also a peer reviewer for 18 international

Feng Fu, "Advanced Modelling Techniques in Structural Design, ISBN: 978-1-118-82543-3, 288 pages, May 2015, Wiley-Blackwell.

Feng Fu, "Structural Analysis and Design to Prevent Disproportionate Collapse", March 10, 2016 Forthcoming by CRC Press, ISBN 9781498706797

Dr Sadowski is a Lecturer in Structural Engineering at Imperial College London. He holds an MEng and PhD in Structural Engineering and an MSc in Mathematics from the University of Edinburgh.

His research interests include shell structures, buckling and stability, computational mechanics, characterisation of the post-yield material properties of mild carbon steels and the modelling granular solid flows in silos.

He currently teaches computational methods, theory of thin-walled shell structures and structural fire engineering at both undergraduate and postgraduate levels. He currently supervises 3 PhD students and has published 20 papers in international journals.