

Professor Asif Sohail Usmani

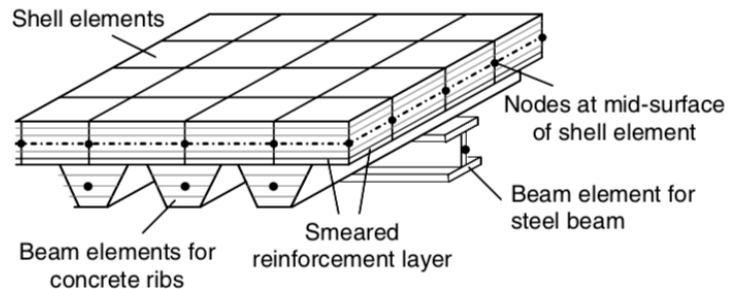


Figure 2. Schematic of OpenSees model for composite structures

From: Jian Jiang, Asif Usmani, and Guo-Qiang Li, (2014). Modelling of steel-concrete composite structures in fire using OpenSees. *Advances in Structural Engineering* 17(2): 249–264

See:

<https://www.eng.ed.ac.uk/about/people/prof-asif-usmani>

[https://www.research.ed.ac.uk/portal/en/persons/asif-usmani\(5dc15d7c-e505-47f0-af70-2fc1e4a6df51\).html](https://www.research.ed.ac.uk/portal/en/persons/asif-usmani(5dc15d7c-e505-47f0-af70-2fc1e4a6df51).html)

<https://scholar.google.co.uk/citations?user=bAIPtWoAAAAJ&hl=en>

https://www.researchgate.net/profile/Asif_Usmani

<https://www.bse.polyu.edu.hk/People/asusman/index.html>

Head, Department of Building Services Engineering (BSE), OpenSees
Hong Kong Polytechnic University

Formerly:

School of Civil and Environmental Engineering, The University of Edinburgh, Scotland, UK

Biography:

Prof Usmani joined PolyU in August 2016 after working in UK academia for nearly 30 years. After a Master's degree in Structural Engineering from Stanford University (California), his research career began with developing finite element codes for simulation of foundry casting processes at Swansea University involving modeling of fluid flow, heat transfer and phase change. His background in structural engineering and computational heat transfer and fluid dynamics led him to take up fire safety engineering research (focusing on fire resistance of structures) upon accepting a lectureship position at University Edinburgh (1995). Prof Usmani's predominant research interest over the past 20 years has been to understand the thermo-mechanical behaviour of structures in real fires using analytical and computational methods validated with experimental data. The aim of this work is to move away from the prevalent prescriptive practice for design of structural fire resistance by developing new and rational design methods in which realistic representations of demand (fire and loads) are set against scientifically robust estimates of structural capacity (resistance) in order to ensure reliable performance. His research has yielded over 250 peer reviewed publications; authored and edited books; and many technical reports resulting from research funding in excess of HK\$100 million so far.

Education:

BE (Civil Engineering), NED University of Eng. & Tech.

MS (Structural Engineering), Stanford University, California

PhD, University of Wales, Swansea

Research Interests:

Computational heat/mass transfer and CFD using the finite element method.
Computational structural/solid mechanics using the finite element method.
Analysis, modeling and design of structures in fire.

Selected Publications:

Huang, H.-C. and Usmani, A. S. (1994). *Finite Element Analysis for Heat Transfer*. Springer

Usmani, A., Drysdale, D., Rotter, J., Sanad, A., Gillie, M., Lamont, S., O'Connor, M., O'Callaghan, D., Elghazouli, A., Izzuddin, B., Richardson, A., Bailey, C., and Newman, G. (2000). *Behaviour of Steel Framed Structures Under Fire Conditions*. Tech. rep. School of Civil and Environmental Engineering, The University of Edinburgh

A.S. Usmani, J.M. Rotter, S. Lamont, A.M. Sanad and M. Gillie, "Fundamental principles of structural behaviour under thermal effects". *Fire Safety Journal*, Vol. 36(8), pp 721-744, 2001

Gillie, M., Usmani, A. S., and Rotter, J. M. (2002). A structural analysis of the Cardington British steel corner test. *Journal of Constructional Steel Research* 58(4): 427-442

Usmani, A.S., Chung, Y.C. and Torero, J.L. (2003), "How did the WTC towers collapse: a new theory", *Fire. Safety. J.*, 38(6), 501-533.

Gillie, M., Usmani, A., and Rotter, M. (2004). Bending and membrane action in concrete slabs. *Fire and Materials* 28(2-4): 139-157.

Usmani, A. and Cameron, N. (2004). Limit capacity of laterally restrained reinforced concrete floor slabs in fire. *Cement and Concrete Composites* 26(2): 127-140

A. Usmani, D.J. Lange, A. Webb, C.S. Manohar and V.S. Sundar, "Reliability of structural members subjected to fire", Paper in a conference that is unidentified in the pdf file, June 2010

P. Khazaeinejad, P., A.S. Usmani, O. Laghrouche, 2012, Nonlinear stress analysis of plates under thermo-mechanical loads, *Journal of Physics: Conference Series*, 382, 012022.

Jiang, J., Khazaeinejad, P., and Usmani, A. (2012). Nonlinear analysis of shell structures in fire using OpenSees. in: *Proceedings of the 20th UK Conference of the Association for Computational Mechanics in Engineering (ACME2012)*. Manchester, UK

Asif Usmani, Jian Zhang, Jian Jiang, Yaqiang Jiang, P. Kotsovinos and Ian May, "Using OpenSees for structures in fire" *International Journal for Structural Fire Engineering*, March 2012

Jiang, J. and Usmani, A. (2013). Modeling of steel frame structures in fire using OpenSees. *Computers & Structures* 118: 90-99

Jian Jiang, Guo-Qiang Li and Asif Usmani, "Fire-induced progressive collapse analysis of steel structures using OpenSees", *The Pacific Structural Steel Conference (PSSC 2013)*, Singapore, 8-11 October 2013

Kotsovinos, P & Usmani, A 2013, 'The World Trade Center 9/11 Disaster and Progressive Collapse of Tall Buildings' *Fire Technology*, vol 49, pp. 741-765

Payam Khazaeinejad, Asif S. Usmani and Omar Laghrouche, "Transient thermoelastic analysis of plates by hybrid-Trefftz method", *ICOVP-2013*, Lisbon, Portugal, 9-12 September 2013

Jian Jiang, Guo-Qiang Li and Asif Usmani, "Influence of fire scenarios on progressive collapse mechanisms of steel framed structures", *Steel Construction*, Article No. 33, March 2014

P. Khazaeinejad, A.S. Usmani and O. Laghrouche, "An analytical study of the nonlinear thermo-mechanical behaviour of thin isotropic rectangular plates", *Computers & Structures*, Vol. 141, pp 1-8, August 2014

Jian Jiang, Asif Usmani, and Guo-Qiang Li, (2014). Modelling of steel-concrete composite structures in fire using OpenSees. *Advances in Structural Engineering* 17(2): 249-264

Jian Jiang, Guo-Qiang Li and Asif Usmani, "Analysis of composite steel-concrete beams exposed to fire using OpenSees", *Journal of Structural Fire Engineering*, March 2015

Binhui Jiang, Guo-Qiang Li and Asif Usmani, "Progressive collapse mechanisms investigation of planar steel moment frames under localized fire", *Journal of Constructional Steel Research*, Vol. 115, pp 160-168, December 2015

P. Khazaeinejad, A.S. Usmani and O. Laghrouche, 2015, Temperature-dependent nonlinear behaviour of thin rectangular plates exposed to through-depth thermal gradients, *Composite Structures*, 132, 652-664.

P. Khazaeinejad and A.S. Usmani, "Temperature-dependent nonlinear analysis of shallow shells: A theoretical approach", *Composite Structures*, Vol. 141, pp 1-13, May 2016

P. Khazaeinejad and A.S. Usmani, "On thermo-mechanical nonlinear behaviour of shallow shells", *International Journal of Non-Linear Mechanics*, Vol. 82, pp 114-123, June 2016

P. Khazaeinejad and A.S. Usmani, Temperature-dependent analysis of shallow shells and plates subjected to fire induced three-dimensional thermal gradients, in preparation to submit for review and publication.

P. Khazaeinejad and A.S. Usmani, Nonlinear analysis of heated beams: Modeling benchmarks, in preparation to submit for review and publication.