

Fire Resilience of Structures

Synopsis.

The class will provide an overview of the fundamentals of fire dynamics in structures. It will introduce simple methods of quantifying that involve estimating temperatures in building compartments and the temperatures that individual structural members get exposed to as a function of time. Behaviour of common construction materials (concrete, timber, and steel) exposed to fire will be studied. Analysis principles are then applied to the fire problem (Hand and computational). An introduction to current design procedures and objective based design will be provided.

Assessment

- Coursework participation and attendance: 30%
- Final Project (To be delivered, presented and defended as an Exam in class): 70%

Lectures (assuming 3 hour weekly blocks)

Lectures 1 - 3 relevant background in fire dynamics, smoke management and egress

Lecture 4 Introduction and history of structural fire engineering

Lecture 5 Heat transfer

Lecture 6 Fire models for structural engineering

Lecture 7 Material behaviour at high temperature

Lecture 8 Structural mechanics at high temperature

Lecture 9 Structural design for fire resistance

Lecture 10 Resilience Concepts for Infrastructure

Lecture 11 Guest lecture - industrial perspective

Lecture 12 Prescriptive, Objective and Performance Based Design