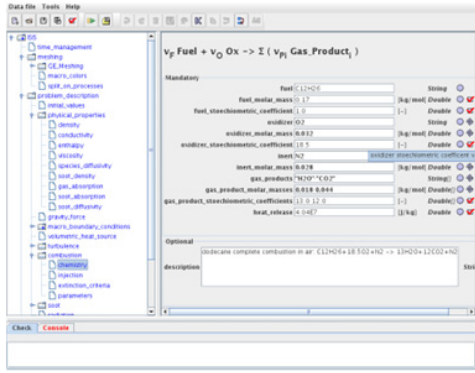


# A set of simulation tools for fire and smoke modelling: validation against results of the OECD-PRISME programme

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## A set of computer codes:

Verified and Validated softwares,

A common Graphical User Interface,

ISIS: free download on <https://qforge.irsn.fr/gf/project/isis> with tutorial,

SYLVIA: distributed to industrial companies under a paying license (contact [sylvia@irsn.fr](mailto:sylvia@irsn.fr))

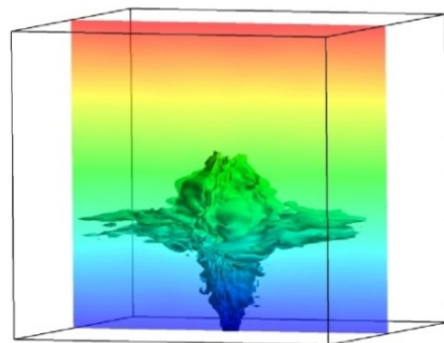
## ISIS, a CFD model

### ❖ Basic Flow Modelling

- Mass and momentum conservation equations
  - Incompressible flows
  - Low-Mach number flows
- Transport equation for scalar

### ❖ Turbulence Modelling

- RANS:
  - k-ε, k-ε RNG
  - k-ε REA, k-ε V<sup>2</sup>-f
- LES
  - Smagorinsky
  - WALE

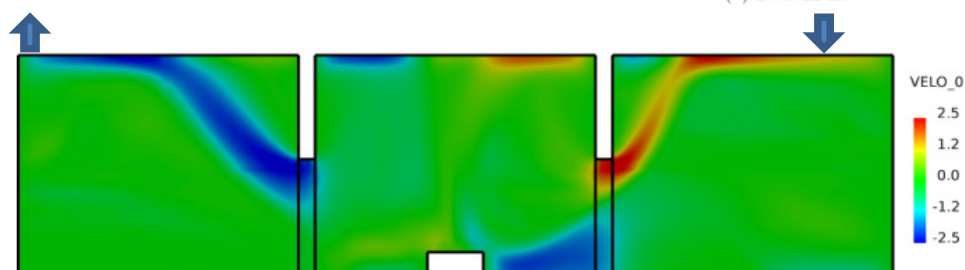
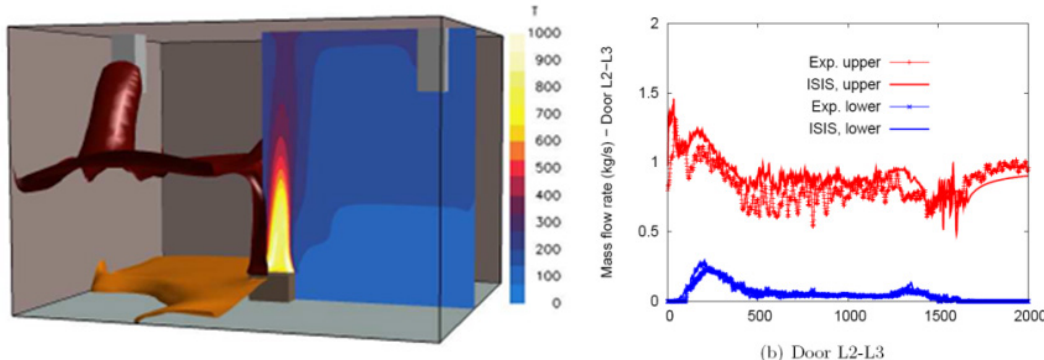


### ❖ Heat transfer Modelling

- Energy conservation for flows, solids
- Radiation modelling (P-1, FVM)

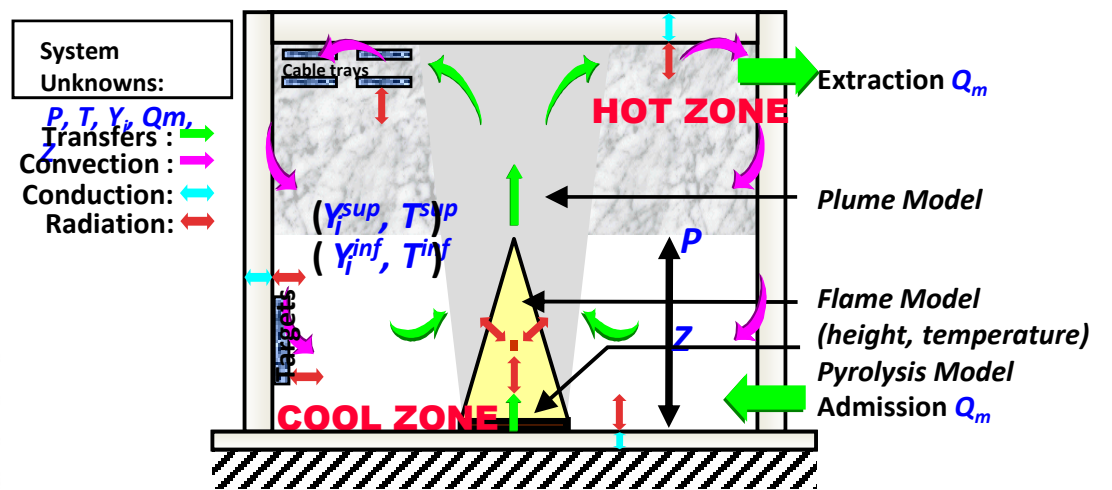
### ❖ Combustion Modelling

- Non-premixed combustion (EDC)
- Soot production (1 or 2 steps models)
  - Khan & Greeves, Magnussen, Moss
- Specific modelling
  - Oxygen limiting law on mass loss rate
  - Coupling with a ventilation system



## SYLVIA, a zone model code

[https://qforge.irsn.fr/gf/download/docmanfileversion/4600/18178/SYLVIA\\_e.pdf](https://qforge.irsn.fr/gf/download/docmanfileversion/4600/18178/SYLVIA_e.pdf)

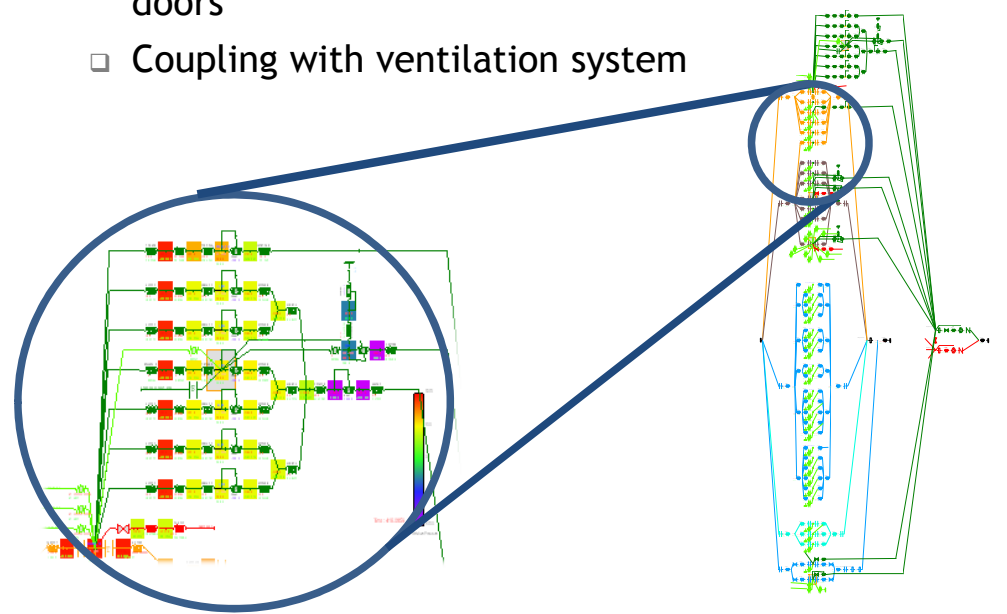


### ❖ Basic flow and heat transfer Modelling

- Mass and energy conservation equations
  - P, T, Yi homogeneous in each zone

### ❖ Fire scenario Modelling

- Spray systems, filter clogging, fire damper,
- Oxygen limiting law on mass loss rate
- Aerosols: transport and deposition openings, fire doors
- Coupling with ventilation system



## PRISME, OECD programme: Large Scale Multi-room Fire Experiments

DIVA : IRSN Large scale facility aimed at providing experimental data on fire scenarios in a multi room configuration with a mechanical ventilation network

