



Smoke Movement in an Atrium with a Fire with Low Rate of Heat Release

by

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Smoke Movement



Hot smoke will normally produce an upper zone in a space
With a fire.

Vertical temperature Gradient and Low Rate of Heat Release



Small fire, Smouldering fire, heat and contaminant realise,...



Plume in Temperature Gradient

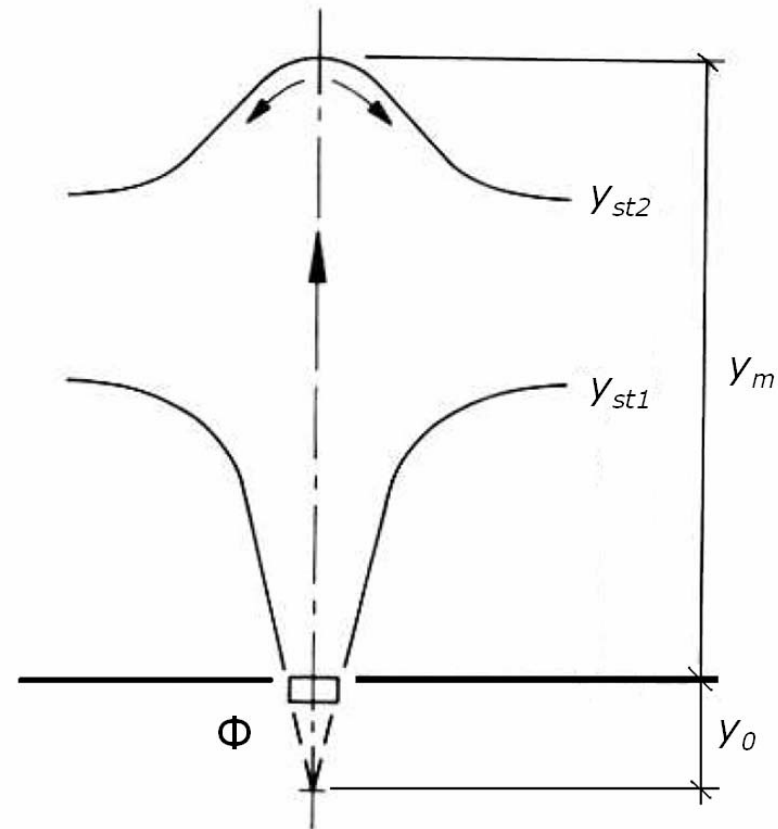
Stratification height is
Equal to

$$y_m = 0.98 \cdot \Phi_k^{1/4} (dT/dy)^{-3/8} + y_0$$

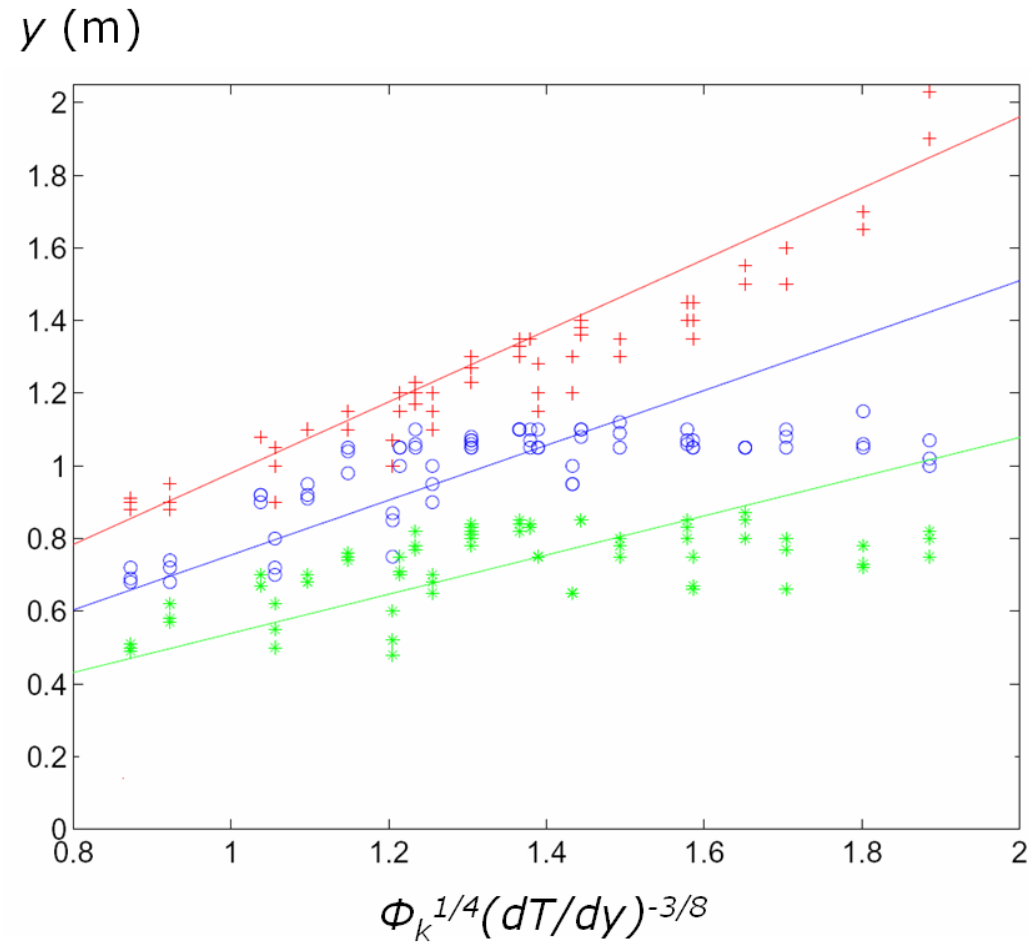
$$y_{st1} = 0.55 \cdot y_m$$

$$y_{st2} = 0.77 \cdot y_m$$

This expression is used for
displacement ventilation, can
it also be used for **smoke
management**?



Plume in Temperature Gradient



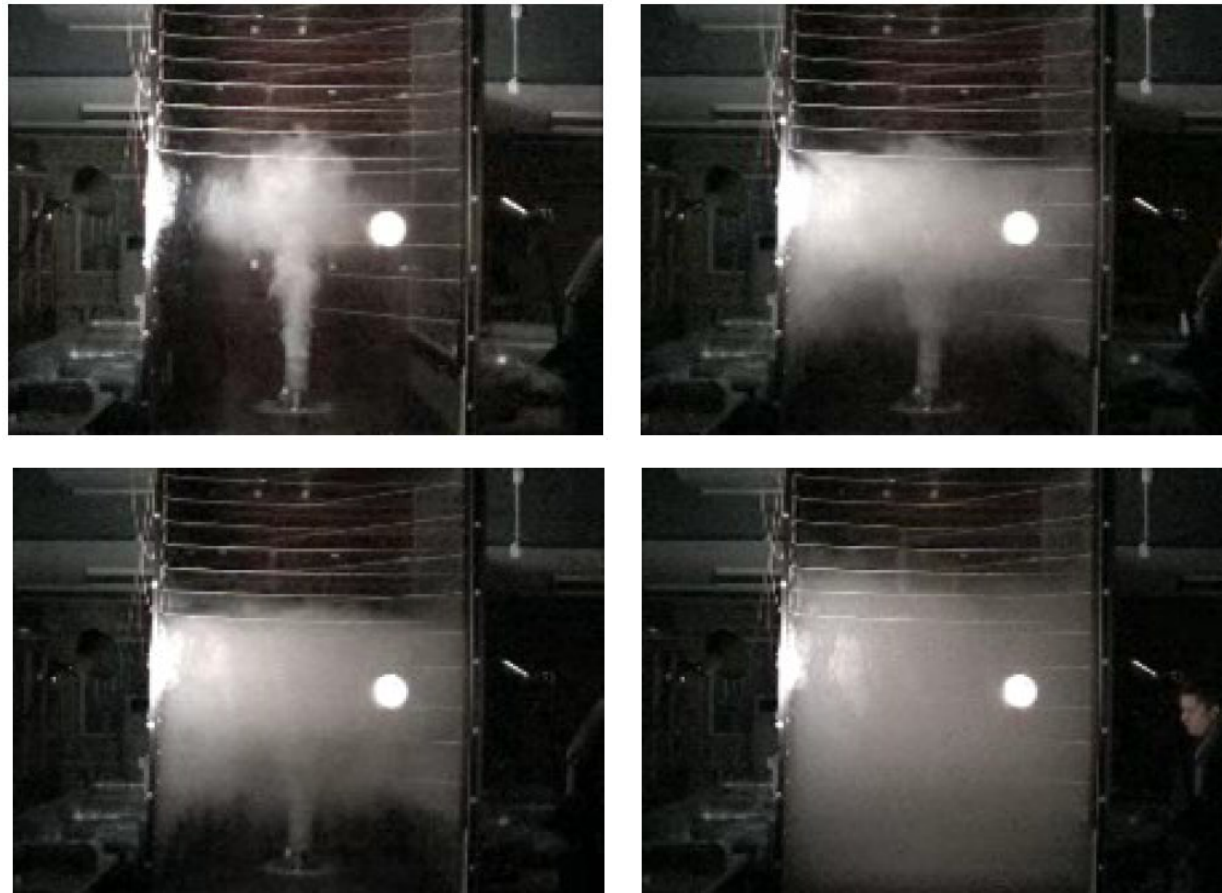
$$y_m = 0.75 \cdot \Phi_k^{0.25}(dT/dy)^{-0.26}$$

$$y_{st1} = 0.23 \cdot \Phi_k^{0.23}(dT/dy)^{-0.06}$$

$$y_{st2} = 0.44 \cdot \Phi_k^{0.21}(dT/dy)^{-0.04}$$

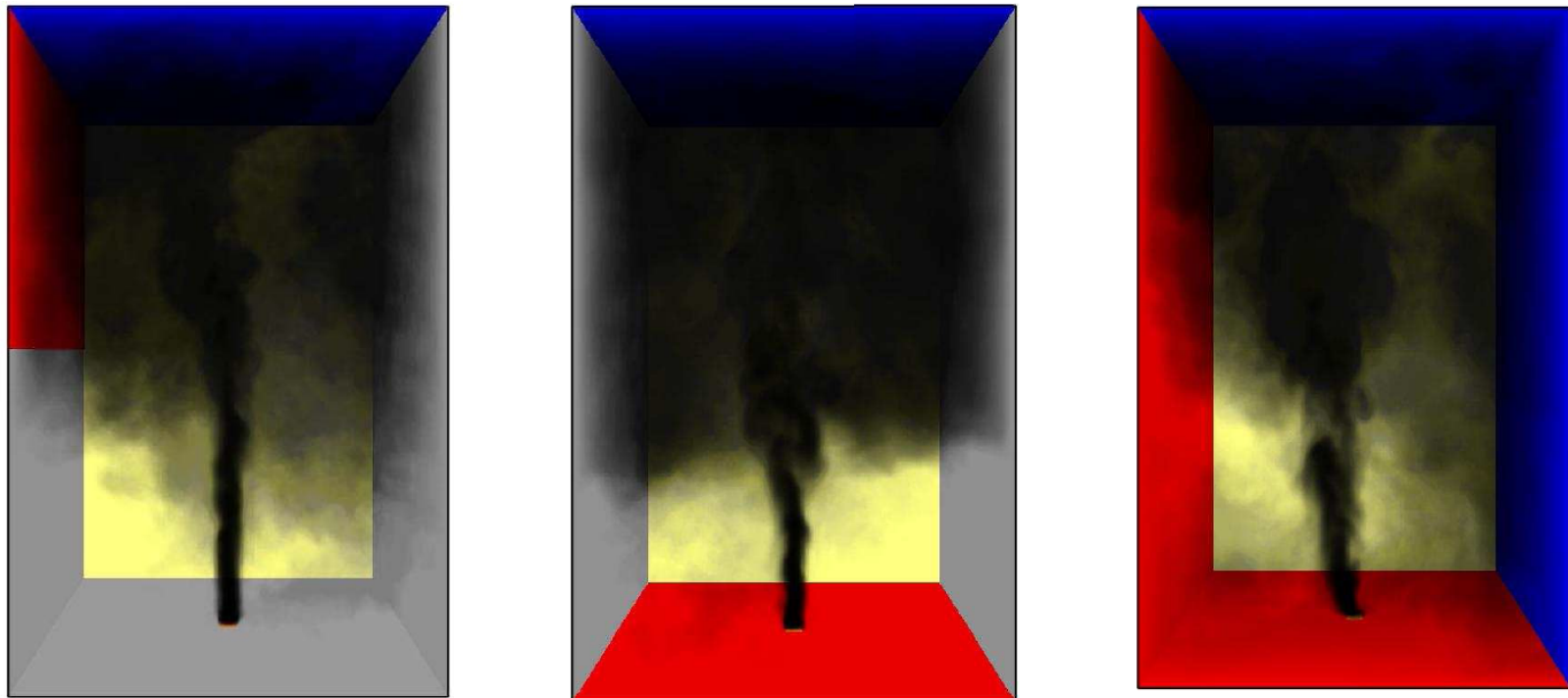
Low Effect Fire, Model Experiment

Development of smoke movement without ventilation.
Initial values corresponds to the expressions: y_m , y_{st1} and y_{st2}

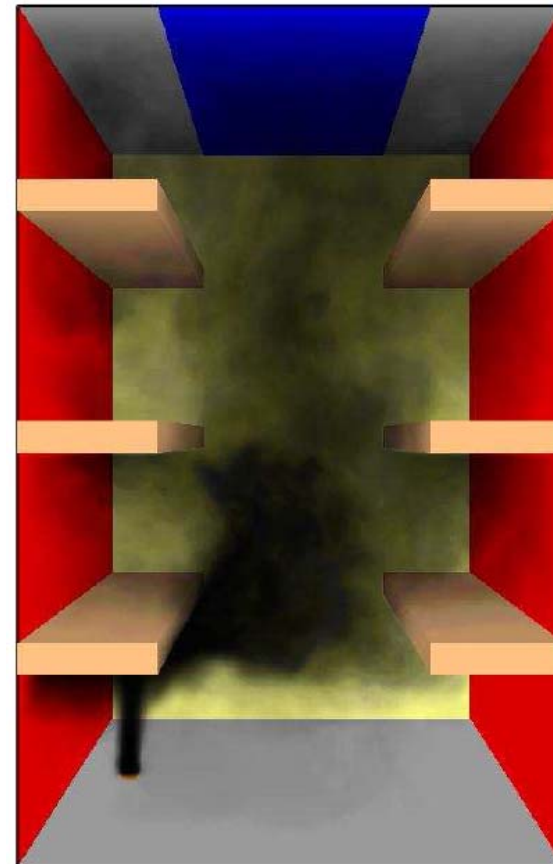


Smoke Movement in an Atrium with Low Heat Release

The fire is of 15 kW corresponding to the fire in a dustbin. The cold surfaces are 15°C and the warm surfaces are 25°C. The initial temperature in the atrium is 23°C. The figures show the situation after 100 seconds of fire.



Smoke Movement in an Atrium with Open Storeys (Low Heat Release)





Thank you!