Context
Naturally ventilated buildings harness readily available resources such as internal buoyancy gains and wind forcing in achieving comfortable interior conditions. Although these resources are free, they are time-variable and can be difficult to control as a result of which the nonlinear interplay between sometimes competing resources may lead to sub-optimal ventilation states.

Objectives
• Study and summarize the existing analytical models
• Validate these analytical models with a commercial CFD software (Fluent)
• Assess the influence of the geometry and the type of heat source inside the rooms numerically
• Propose improvement/ameliorations for the analytical models

Analytical model
Study the existing analytical models and pull out the relevant measurable parameters.

\[
\frac{A^*}{H^2} = \frac{\lambda^{3/2}}{\rho_0 H B^{2/3}} \left[ \frac{1}{\left( \frac{A^1}{A^2} \right)} \right]^{5/3} - \lambda \Delta p
\]

Computational Fluid Dynamics
Reproduce the flow appearing in natural ventilation using the solver Fluent

Improvement of the analytical model
Develop a more complex model for natural ventilation that improves the prediction of the important parameters of the flow

Validation of the numerical model
Compare the results from the numerical simulations with the analytical model. Assess the quality of the simulations and improve the numerical model.

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