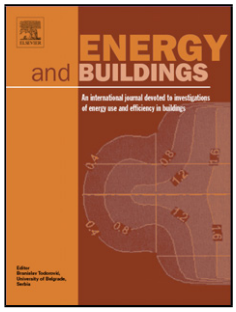

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Naturally ventilated Double-Skin Façade in Modeling and Experiments

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Highlights

- An experimental validation of a model, developed for integration of DSF in Building Simulation tools, is given.
- The validation was based on heat removed by natural ventilation, which is the main parameter in passive cooling systems.
- Selecting hourly data associated to low wind fluctuations a good degree of correlation was found between the predicted total driving pressure and the flow measurements.
- 2D CFD analysis was performed for selected thermal and wind conditions, offering a detailed insight in flow reversal and recirculation phenomena.

Abstract

The modelling activity presented in this work aims at the assessment of a simplified model, named BS model, which was specifically developed for integration of DSF in Building Simulation. The BS model is based on a pressure loop and on an integral approach to the heat transfer along the vertical channel. It considers buoyancy as a function of the average temperature in the channel. The wind action is taken into account by means of wind pressure coefficients (*Cp*) on the façade openings.

The focus of this study is the experimental validation of the modelling "core": the natural ventilation through the DSF. The validation is based on the dataset of the experimental campaign conducted on a DSF test facility, the "Cube", in Denmark, under IEA ECBCS ANNEX 43/SHC Task 34. Hourly simulations were performed with the BS model for the 15 days of the experimental campaign.

A CFD modelling activity was also carried out on a selection of four cases, extracted from the experimental benchmark and representative of different temperature and pressure boundary conditions.