

AIR CURTAIN CONTROL

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This article deals with the control of air curtain (AC) in the air-conditioning subsystem of intelligent buildings or buildings in general. It describes the sequence steps of air curtain simulation in Comsol Multiphysics. The goal of this paper is proposition of the control function (CF) of air curtain, which would meet the selected global conditions and would be effective in terms of energy consumption.

The model was created and defined in the Chemical Engineering Module (Variable Density Flow → Weakly Compressible Momentum Transport → Weakly Compressible Navier-Stokes), in which was possible to simulate the interaction and airflow.

The criteria for control function of power AC were determined by values, which were acquired from simulation. Speed of flow AC has to be bigger than the speed of outside airflow into the room due to ensuring an effective separation of thermal zones. The measured values showed the dependence between outdoor airflow and AC.

AC will work in three working modes. First mode (for entrance wind speed 0-5 m/s) the CF regulates the performance of AC. The second mode (for entrance wind speed 5-9 m/s) AC performance will be maximum (output of air curtain will be 9 m/s). AC will be deactivated in the third mode – for entrance wind speed is 0 or bigger than 9 m/s, because here is AC inefficient.

Keywords: air curtain, COMSOL, air flow simulation, control function

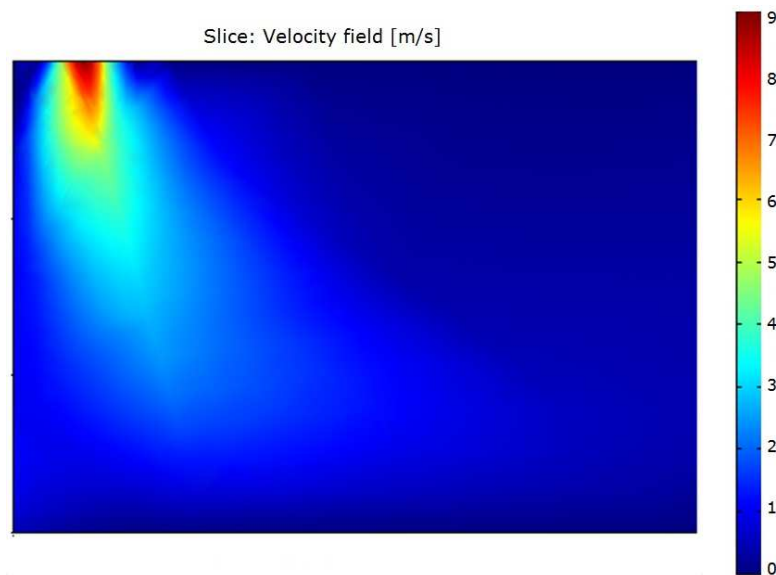


Fig. 1: Result of air-flow simulation, axis XZ (detail view)