

عنوان مقاله:

Experimental and Numerical Dynamic Investigation of a Swirling Jet: Application to Improve the Efficiency of Air Diffusion in an Occupied Zone

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خلاصه مقاله:

When reducing the energy prerequisites of buildings, the correct distribution of fresh air flows injected into the living rooms poses a problem. If the problem of mixing the injected air in the ambient air is not effectively solved, there will be a strong deterioration in air quality and comfort. In this research, a new design of swirling diffuser is investigated experimentally and numerically using large eddy simulations. The influence of fins is studied for the improvement of air diffusion and jet mixing with ambient air. The study was carried out for a fins angle of ۳۰° with the jet's axis and ۶۰° with the blowing orifice's plane with the condition of uniform heat flux of the air. The working fluid used is air. It has been validated that using fins leads to a greater spreading of the jet and good air mixing compared to those obtained from smooth tubes (circular nozzle). To enhance the accuracy of the turbulence models' predictions, three turbulence models are tested: the wall-adapting local eddy-viscosity turbulence model (LES/WALEVM), Smagorinski-Lilly (LES/S-LM) model and the kinetic-energy transport model (LES/K-ETM). It is worth highlighting that the LES/K-ETM model is well established in the prediction of swirling flows, which have been successfully compared with experimental results.

کلمات کلیدی:

Swirl diffusers, Large eddy simulation, Indoor air quality, CFD, Turbulence models

