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Performance of Two-Equation Turbulence Models for Numerical Simulation of Ventilation Flows

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ABSTRACT

To investigate the performance of turbulence models in the numerical simulation of recirculating ventilation flows, comparisons have been made for three types of two-equation models: the k-ε, k-ω and k-τ models. A modified k-ω model recently proposed by the authors has been introduced and implemented. All the models are applied with the wall-function method. When using the k-ω models, an extended-to-wall method is also used. Two typical recirculating flows are calculated: the separated flow behind a backward-facing step with a large expansion ratio relevant to room ventilation; and the wall-jet-induced flow in a two-dimensional ventilation enclosure. The predictions are compared with experimental data. The performance of the models is discussed. The modified k-$\tilde{\omega}$ model is shown to be an attractive alternative to the k-ε model.