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Turbulence models evaluation for indoor flows

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Turbulence models for indoor flows have been studied for a long time. In the last decades several models have been proposed and its suitability for internal flows modeling have been assessed against experimental data.

In this work an evaluation of six Reynolds-averaged Navier-Stokes (RaNS) turbulence models implemented in OpenFOAM for indoor ventilation for the isothermal and non-isothermal cases is presented. The models under study were the standard $k-\varepsilon$, the RNG $k-\varepsilon$, the realizable $k-\varepsilon$,the $v2-f$, the $k-\omega$ and the $k-\omega$ SST. The results from these simulations are compared with experimental data from the literature.

From the results, the standard $k-\varepsilon$ model presents a good compromise between convergence, stability, and agreement with experimental data. The RNG $k-\varepsilon$ model also showed good agreement with the experimental data. However, it required more time to achieve convergence. The $k-\omega$ and $k-\omega$ SST models produce significantly different results when compared with the experimental data, particularly in the far wall region.