Turbulence model and validation of air flow in wind tunnel

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Abstrak

As an initial analysis, numerical simulation has more advantages in saving time and costs regarding experiments. For example, variations in flow conditions and geometry can be adjusted easily to obtain results. Computational fluid dynamics (CFD) methods, such as the k-? model, renormalization group (RNG) k-? model and reynolds stress model (RSM), are widely used to conduct research on different objects and conditions. Choosing the appropriate model helps produce and develop constant values. Modeling studies as appropriate, i.e., in the turbulent flow simulation in the wind tunnel, is done to get a more accurate result. This study was conducted by comparing the results of the simulation k-? model, RNG k-? model and RSM, which is validated by the test results. The air had a density of 1,205 kg/m3, a viscosity of 4×10-5 m2/s and a normal speed of 6 m/s. By comparing the simulation results of the k-? model, RNG k-? model and RSM, which is validated by the test results, the third turbulence model provided good results to predict the distribution of speed and pressure of the fluid flow in the wind tunnel. As for predicting the turbulent kinetic energy, turbulent dissipation rate and turbulent effective viscosity, the k-? model was effectively used with comparable results to the RSM models.