Turbulence model and validation of air flow in wind tunnel

Gun Gun Ramdlan G., author

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-ε model, renormalization
group (RNG) k-ε 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-ε model, RNG k-ε 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-ε model, RNG k-ε 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-ε
model was effectively
used with comparable results to the RSM models.