

# FLUENT - Turbulent Pipe Flow (LES)

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## Turbulent Pipe Flow (LES)

Created using ANSYS 13.0

### Problem Specification

Consider fluid flowing through a cylindrical pipe of diameter  $D = 0.0127\text{ m}$  and length  $L = 5D = 0.0635\text{ m}$ . The bulk velocity at the pipe inlet is  $U_{bulk} = 6.58\text{ m/s}$ . Let us consider the case where the density of the fluid is constant. Take density  $\rho = 1.331\text{ kg/m}^3$  and coefficient of viscosity  $\mu = 2.34 \times 10^{-5}\text{ kg/(ms)}$ . The Reynolds number  $Re$  based on the pipe diameter and the bulk velocity is

$$Re = \frac{\rho U_{bulk} D}{\mu} \approx 4750$$

Solve the above fluid flow problem using the LES capability in FLUENT via ANSYS Workbench. Plot the mean and the root mean square velocities versus the radial distance at a particular  $x/D$  downstream of the inlet. Compare the mean velocity obtained from the LES simulation with the mean velocity obtained using the  $k$ - model.

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