

PROBLEM 2, HW2

Physical explanation:

When the flow is turbulent but the Reynolds numbers are moderate, the Reynolds number in the wall region $Re_\epsilon = \frac{\rho u_\tau \epsilon}{\mu}$ is small which means that near the wall the viscous forces are significant and friction effects (therefore friction factor) will depend on the Reynolds number.

When the Reynolds number reaches very high values, $Re_\epsilon = \frac{\rho u_\tau \epsilon}{\mu}$ near the wall is also large, having then a flow with very high Reynolds number everywhere. Hence, the difference between the outer layer and the wall region disappear. Friction factor no longer depends on the Reynolds number.