FLUIDS 2009

Problem Set #4, 11/9/2009, Due 11/16/2009

For plane Poiseuille flow:

1. Find the mathematical form for all terms in the volume integral of the KE budget, and use these to describe how the energy system of the flow works. For the volume you can take a rectangular shape, extending over the full depth between the plates, a distance L in the along-flow direction, and a distance B in the cross-flow (y) direction. [20]

2. Repeat the above analysis in a frame of reference moving with the velocity of the depth-averaged flow. [10]

3. Explain where in the volume energy is created and destroyed, and how it moves between these places. [EXTRA CREDIT]