

## ENSC-283

### Assignment #1

Assignment date: Monday Jan. 12, 2009

Due date: Monday Jan. 19, 2009

**Problem:** (Newtonian fluid shear stress)

The velocity distribution for the flow of a Newtonian fluid between two wide, parallel plates (see Figure) is given by the equation

$$u = \frac{3U_m}{2} \left[ 1 - \left( \frac{y}{h} \right)^2 \right]$$

where  $U_m$  is the mean velocity. The fluid has the viscosity of  $0.04 \text{ lb}\cdot\text{s}/\text{ft}^2$ . If  $U_m = 2 \text{ ft}/\text{s}$  and  $h = 0.2 \text{ in}$ , determine:

- The shearing stress acting on the bottom wall.
- The shearing stress acting on a plane parallel to the walls and passing through the centerline (midplane).

