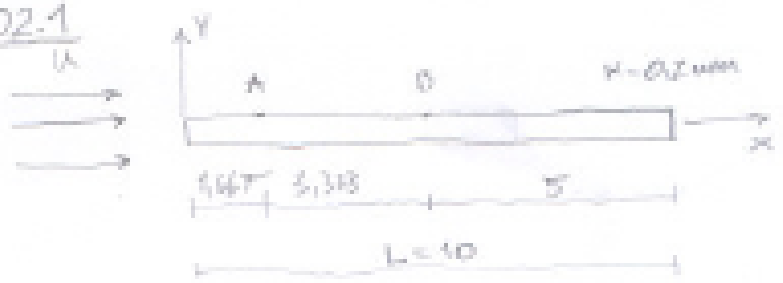
02.1



$Re_{1,crit} = (1,5 - 3,0) \cdot 10^6$

$u = 5,75\ m/s$

$\rho = 1,2\ kg/m^3$

$\mu = 2 \cdot 10^{-4}\ gr/cm\,s = 2 \cdot 10^{-5}\ kg/m\,s$

$B = 1\ m$

$Re_L = \frac{\rho u L}{\mu} = \frac{1,2 \cdot 5,75 \cdot 10}{2 \cdot 10^{-5}} = 2,25 \cdot 10^6 < 3 \cdot 10^6$ ✓

$F = C_F \cdot \frac{\rho u^2 A}{2}$

$A = 2BL = 2 \cdot 1 \cdot 10 = 20\ m^2$

$C_F = \frac{1,4}{\sqrt{Re_L}} = \frac{1,4}{\sqrt{2,25 \cdot 10^6}} = 0,93 \cdot 10^{-3}$ ✓

$F = 0,93 \cdot 10^{-3} \cdot \frac{1,2 \cdot 5,75^2 \cdot 20}{2} = 0,157\ N$ ✓

za tačku A: $Re_x = \frac{\rho u x}{\mu} = \frac{1,2 \cdot 5,75 \cdot 1,667}{2 \cdot 10^{-5}} = 0,575 \cdot 10^6$ ✓

$C_x = \frac{0,7}{\sqrt{Re_x}} = \frac{0,7}{\sqrt{0,575 \cdot 10^6}} = 0,0011$ ✓

$\tau_x = C_x \cdot \frac{1}{2} \rho u^2 = 0,0011 \cdot \frac{1}{2} \cdot 1,2 \cdot 5,75^2 = 0,00028\ Pa$ ✓

$\delta_x = 4,9 \cdot \frac{x}{\sqrt{Re_x}} = 4,9 \cdot \frac{1,667}{\sqrt{0,575 \cdot 10^6}} = 0,0153\ m$ ✓

za tačku B: $Re_x = \frac{\rho u x}{\mu} = \frac{1,2 \cdot 5,75 \cdot 5}{2 \cdot 10^{-5}} = 1125000$ ✓

$C_x = \frac{0,7}{\sqrt{Re_x}} = \frac{0,7}{\sqrt{1125000}} = 0,00066$

$\tau_x = C_x \cdot \frac{1}{2} \rho u^2 = 0,00066 \cdot \frac{1}{2} 1,2 \cdot 5,75^2 = 0,00557$

$\delta_x = 4,9 \cdot \frac{x}{\sqrt{Re_x}} = 4,9 \cdot \frac{5}{\sqrt{1125000}} = 0,023\ m$ ✓

b) $U = 15\ m/s$

$\rho = 1.0\ kg/dm^3 = 1000\ kg/m^3$

$\mu = 1 \cdot 10^{-2}\ g/cm \cdot s = 1 \cdot 10^{-3}\ kg/m \cdot s$

$$Re_L = \frac{\rho \cdot U \cdot L}{\mu} = \frac{1000 \cdot 15 \cdot 10}{1 \cdot 10^{-3}} = 150 \cdot 10^6 > Re,crit$$ ✓

$x = 0{,}1\,L = 1$

$$Re,x = \frac{\rho U \cdot x}{\mu} = \frac{1000 \cdot 15 \cdot 1}{1 \cdot 10^{-3}} = 15 \cdot 10^6$$ ✓ $> Re,crit$

* na více než 30 % ohraničení sloj je turbulentní ✓

$F = C_f \cdot \frac{1}{2} \rho U^2 A$

$A = 2BL = 2 \cdot 1 \cdot 10 = 20$

$$C_f = 0{,}032 \left(\frac{k}{L} + \frac{50}{Re_L} \right)^{1/6} = 0{,}032 \left(\frac{0{,}2 \cdot 10^{-3}}{10} + \frac{50}{150 \cdot 10^6} \right)^{1/6} = 0{,}00368$$

$$F = 0{,}00368 \cdot \frac{1}{2} \cdot 1000 \cdot 15^2 \cdot 20 = 8302{,}5\ N = 8{,}3025\ kN$$ ✓