Flow Through a Uniform Inclined Screen

1)Important Info’: -

➔*This example simulates the flow through a uniform inclined screen using the Screen feature in Single-Phase Flow physics.*

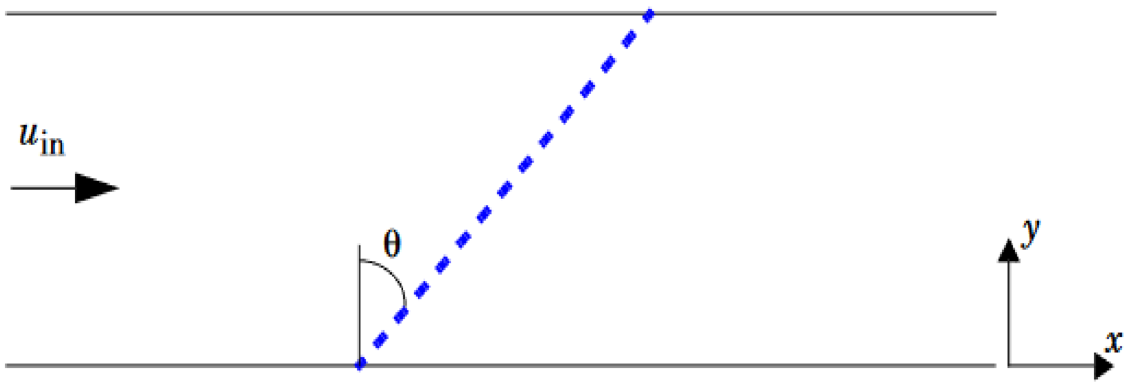


Figure 1: Model geometry showing flow direction and screen inclination.

➔*Air at a temperature of T = 20 °C enters the channel on the left with a uniform inlet velocity of u in = 1 m/s and exits on the right at uniform pressure, p_0 = 0 Pa.*

➔*The flow through the channel is obstructed by a screen inclined at an angle ϑ. The combined* *effect of resistance and refraction (suppression of the tangential velocity component) creates a non-uniform velocity profile on the downstream side of the screen.*

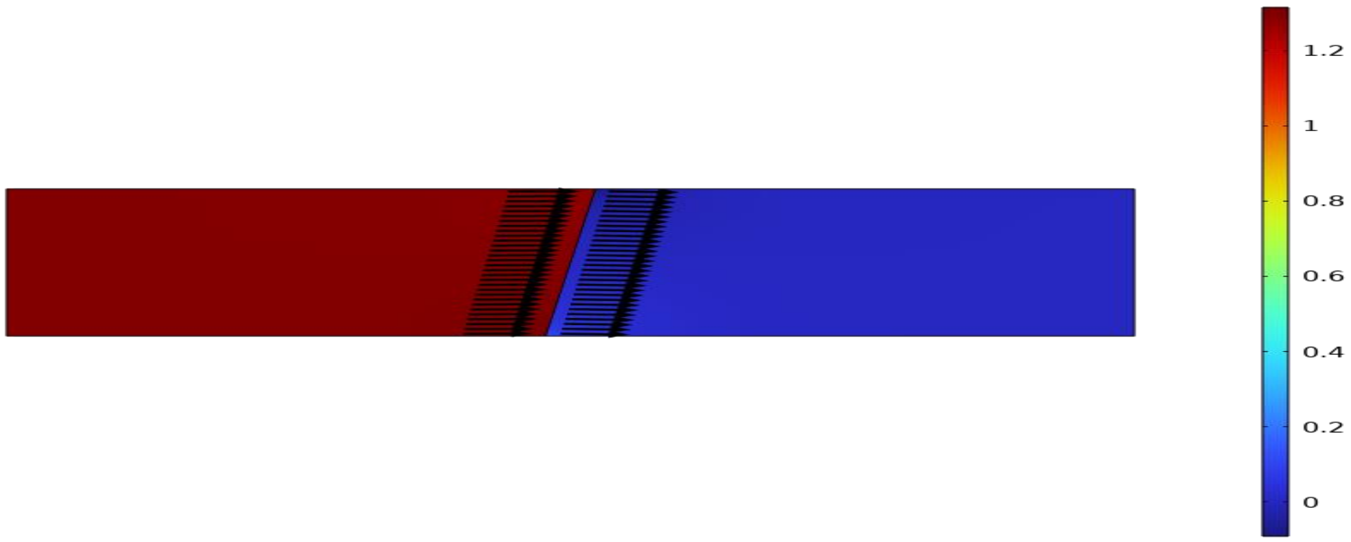
$$\frac{(u/u_{\mathrm{in}}-1)(1+\eta+K\cos^2\theta)}{(1-\eta)\tan\theta\cdot K\cos^2\theta}=\frac{2}{\pi}\log\left(\cot\left(\frac{\pi y}{2}\right)\right)$$

- ***where K and η are the screen resistance and refraction coefficients***

3)Results: -

➔Velocity Surface plot: -

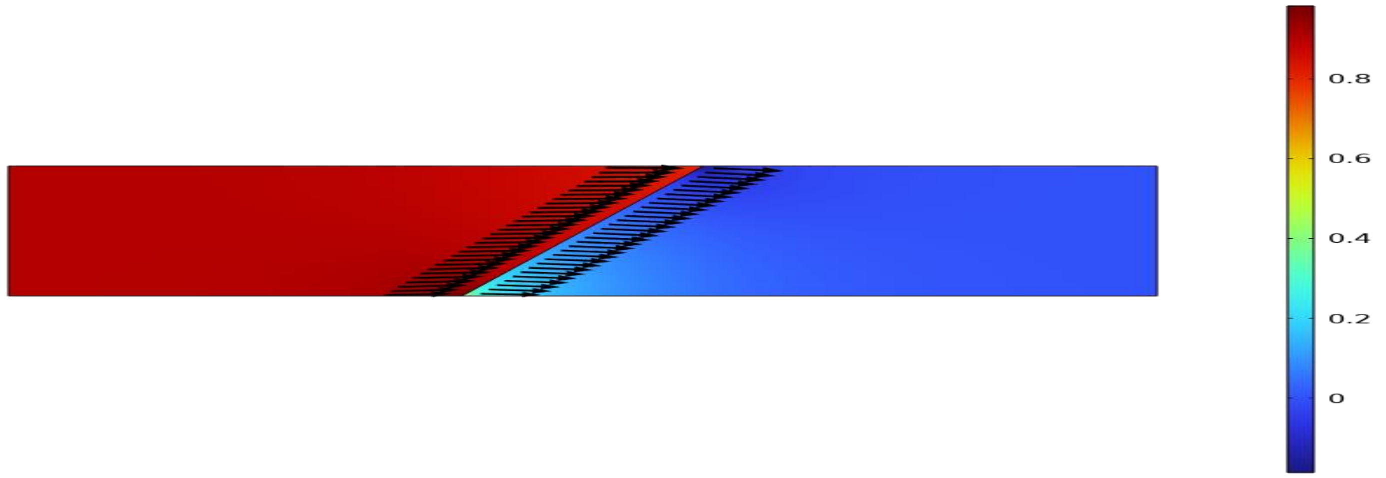
Angle theta =0.17453



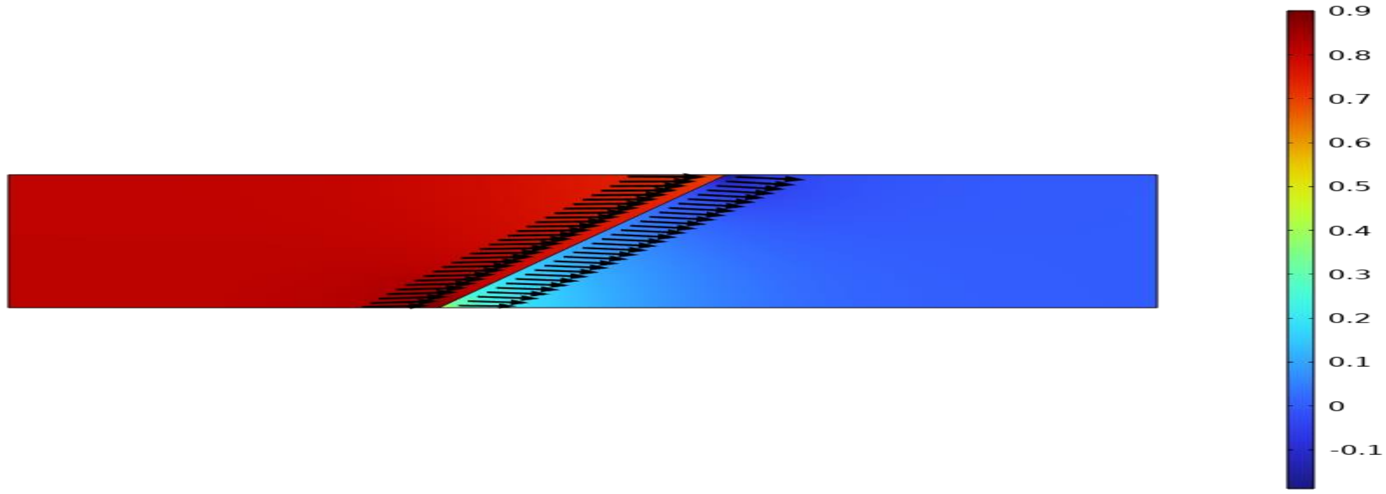
Angle theta =0.34907

Angle theta =0.5236

Angle theta =0.69813

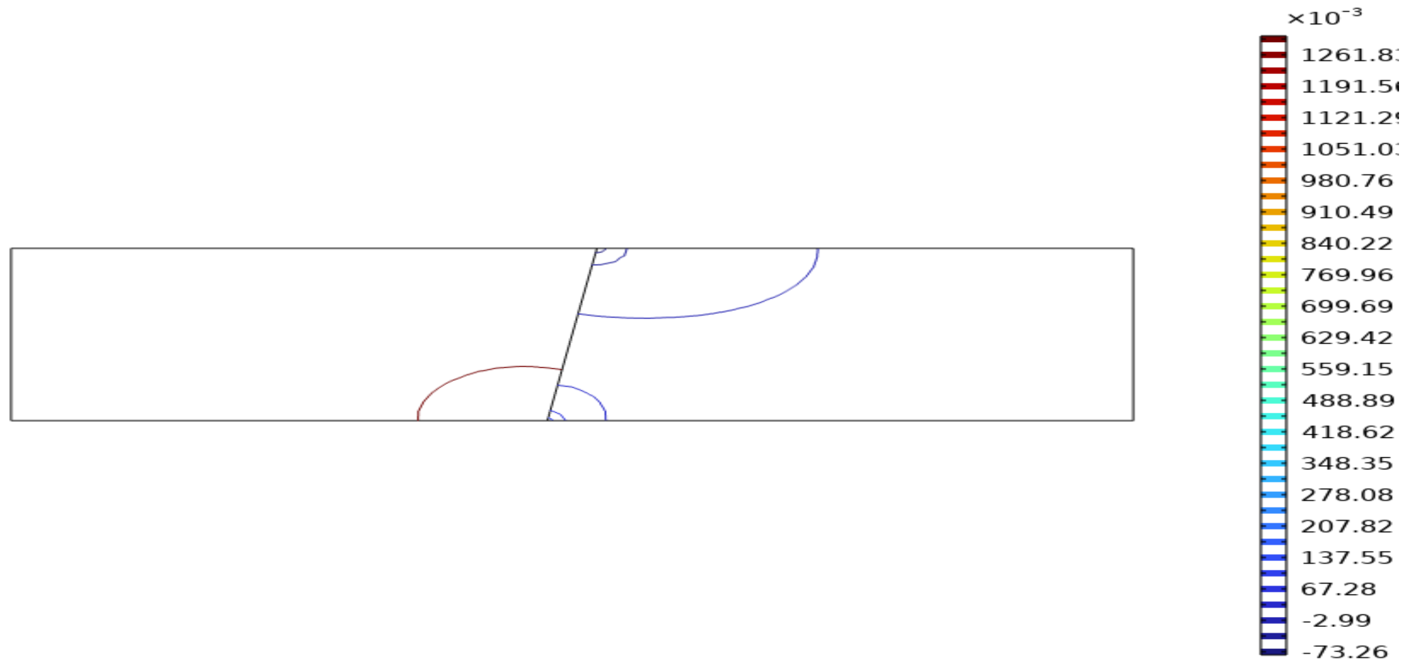


Angle theta =0.7854

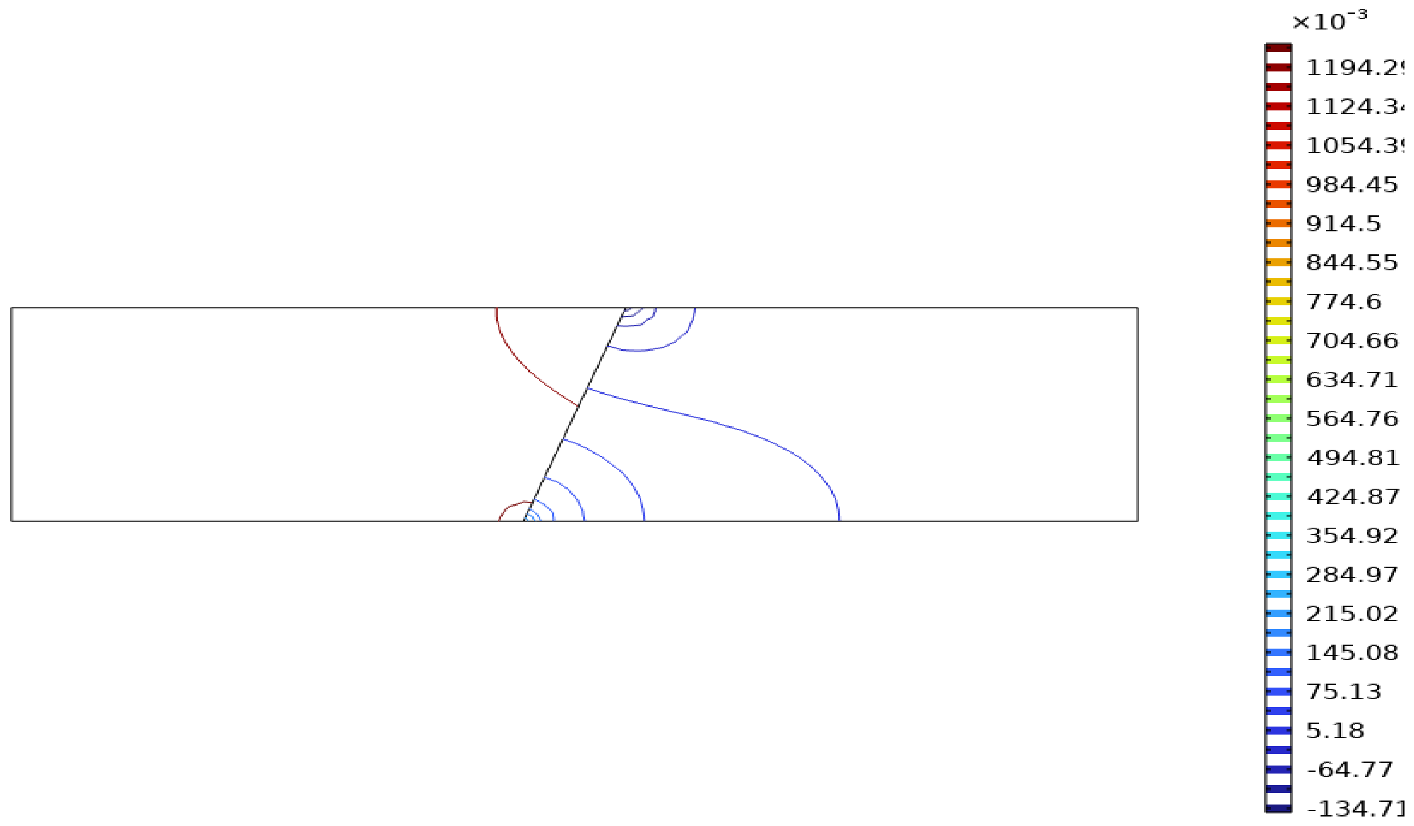


➔Pressure Plot: -

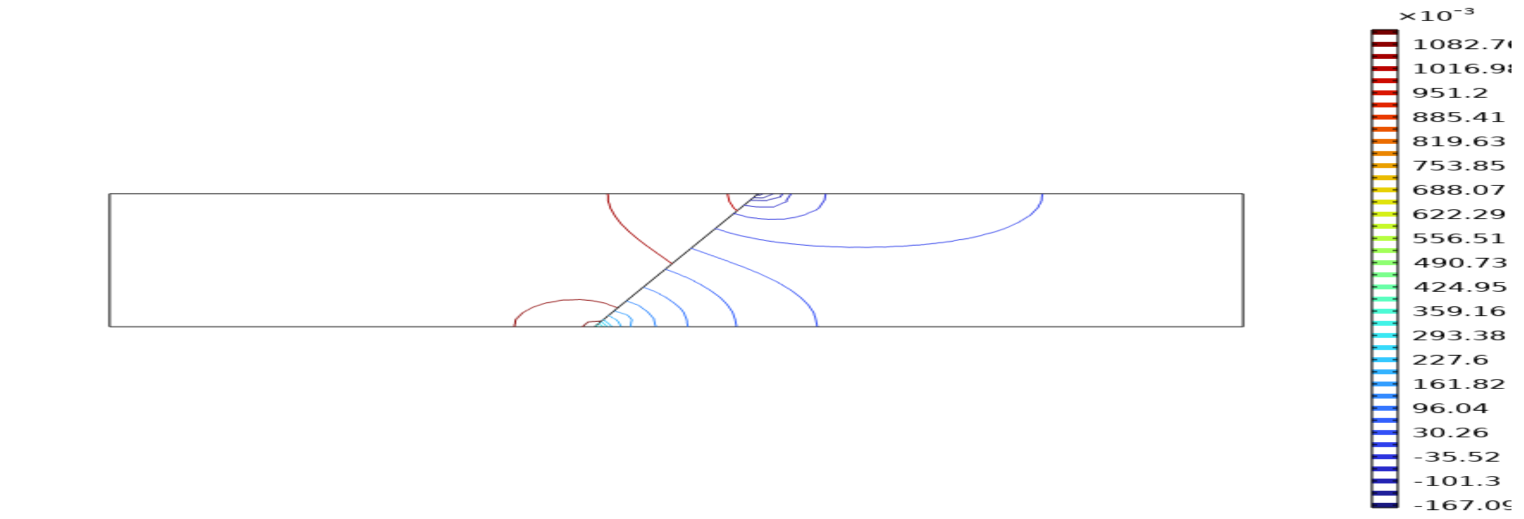
Angle theta =0.17453



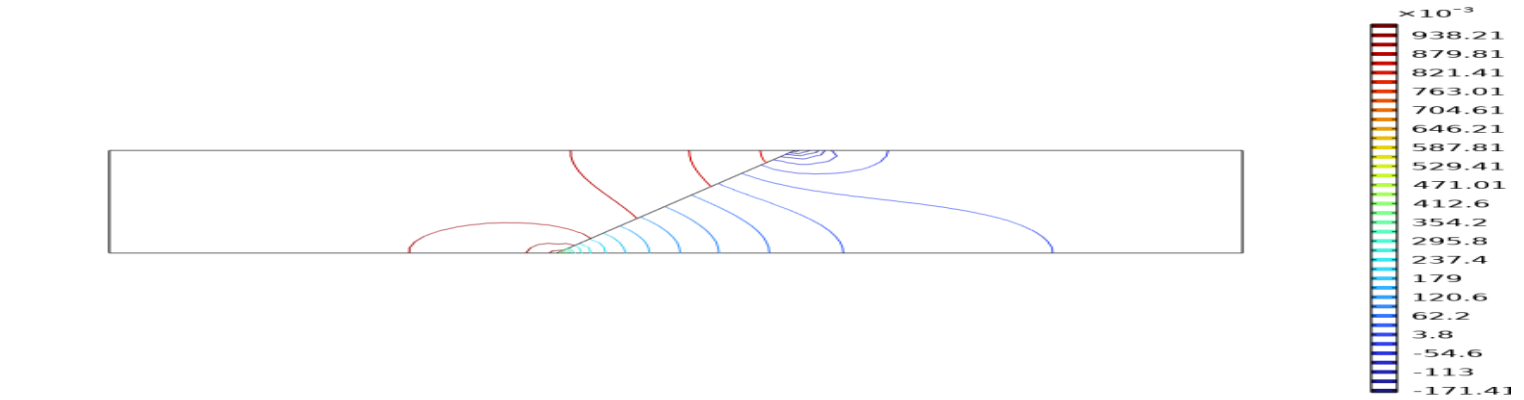
Angle theta =0.34907



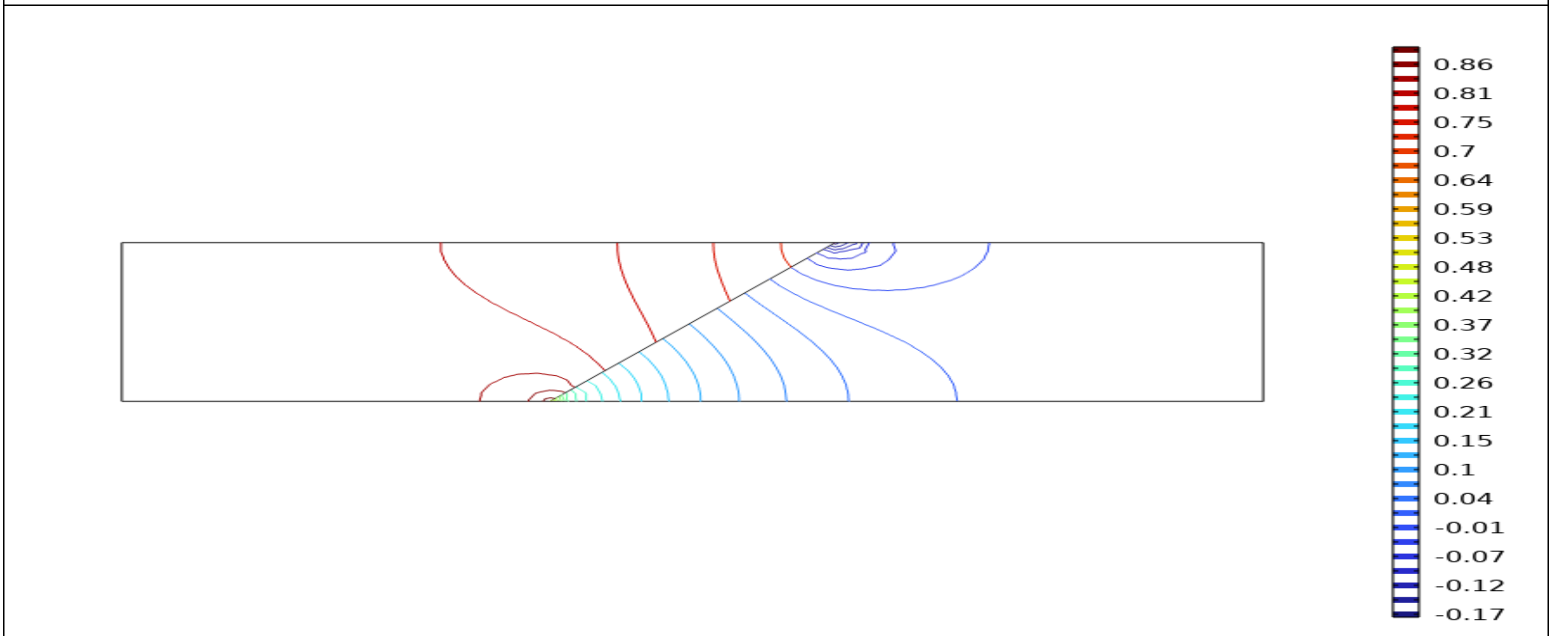
Angle theta =0.5236

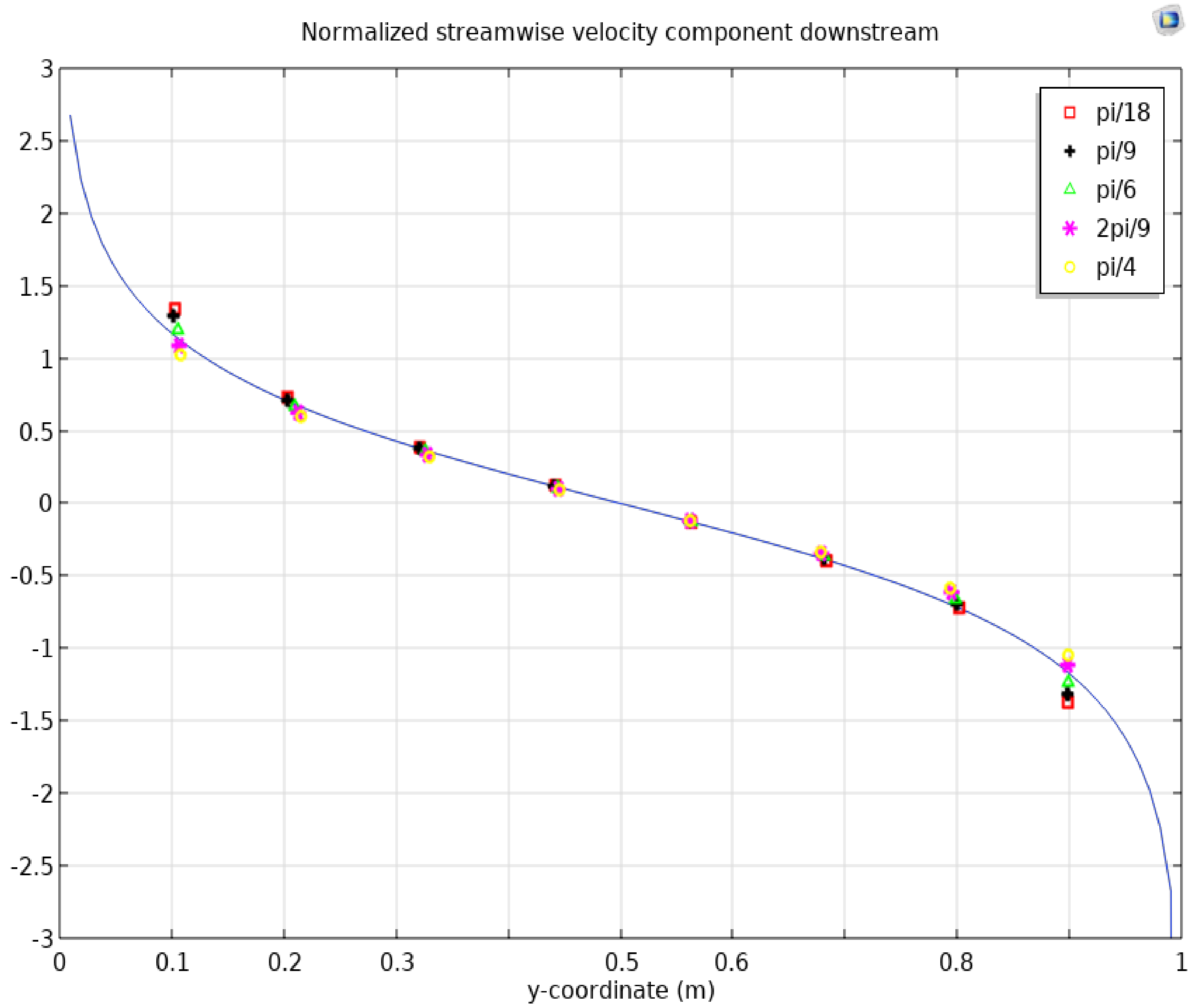


Angle theta =0.69813



Angle theta =0.7854





Normalized streamwise velocity component downstream
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
0.1
0.2
0.3
0.5
0.6
0.8
1
y-coordinate (m)
pi/18
pi/9
pi/6
2pi/9
pi/4