ABSTRACT

Aim of this report is to develop Simulation using OpenFOAM(paraview) for the open channel flow case. Inclination of channel & velocity's value are changed in order to obtain different result. An open channel flow denotes flow with a free surface touching to the atmosphere. Examples: Rivers, canals, spillway, weirs etc. they are driven by only gravity force. Force balance is between gravity and friction. The common fluid in this kind of problems is water and the size of the channels is usually big and with turbulent flow.

Problem Statement

Two Phase Simulation for Turbulence water flow over inclined open channel and its upper surface is directly contact with atmosphere. In order to analyse the behaviour of the fluid, open channel which is about 1 m high (0.5 m for water, 0.5 m for air), 20 m long and 0.2 m wide as shown in figure (1).

Figure (2) shows analytical model for problem

Following constant values and initial values are required to solve problem.

- Kinematic viscosity(nu): 1.48e-05 (air)
- Kinematic viscosity(nu): 1e-06 (water)
- Density(rho): 1000 kg/(m^3) -For Water
- : 1 kg/(m^3) – For Air
- surface tension between air and water is defined as sigma and its value is specified to 0.07 (adopted)
- gravity: 9.8 m/(s^2)
- Initial value velocity = 1 m/s in x direction or in form U = (1 0 0)
- Initial value of (alpha) is 1

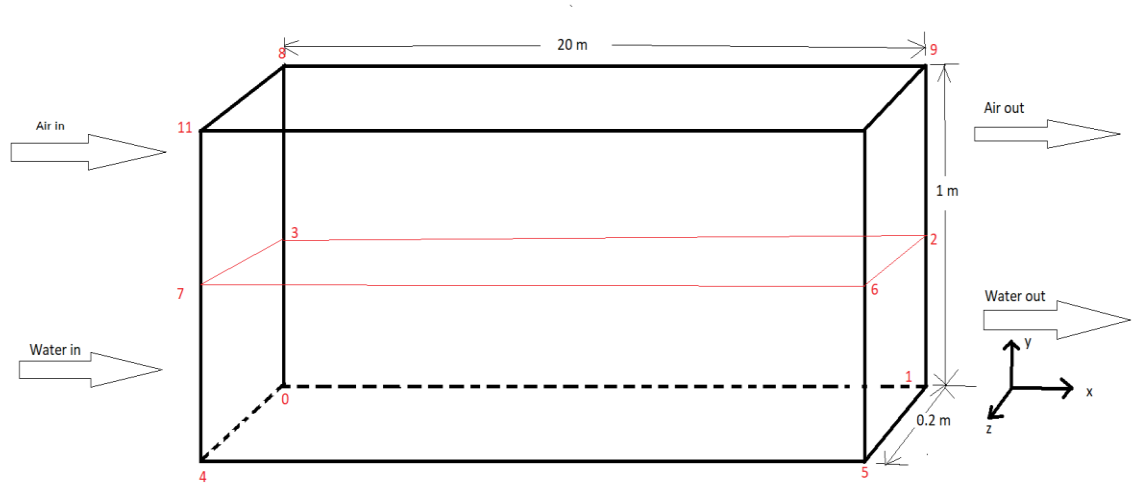
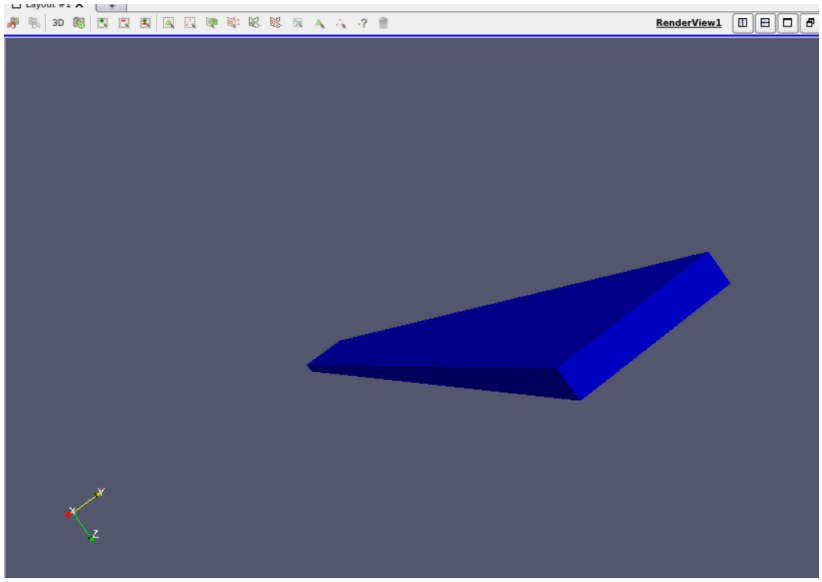
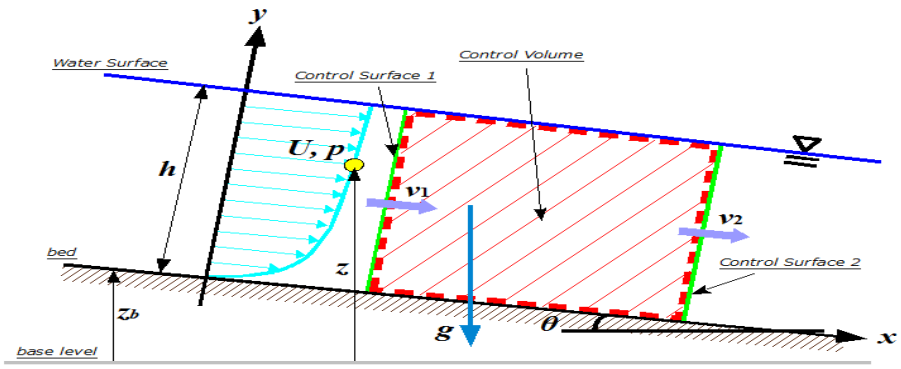

20 m
8
9
Air in
11
Air out
1 m
3
2
7
6
Water out
Water in
y
1
0
x
0.2 m
z
4
5

Figure 1


3D
RenderView1


y
Water Surface
Control Surface 1
Control Volume
h
U, p
v1
v2
bed
z
Control Surface 2
zb
g
θ
x
base level

Figure(2)