Boundary Condition

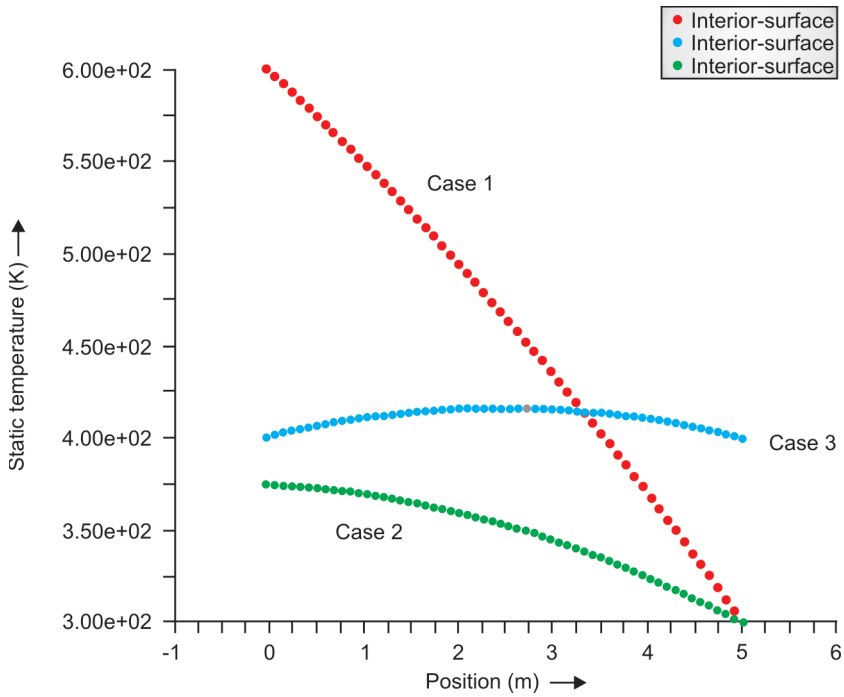
1. Temperature of 600 K is applied at the left edge and 300 K is applied at the right edge
2. The solution is initialised from the left wall
3. The solution is obtained by iterative process and is converged

Postprocessor

1. The graph is plotted between length of the plate on x-axis and the temperature at the wall on y-axis
2. Then the boundary conditions are changed in processor and postprocessor is repeated
3. Comparative graphs are drawn for various boundary conditions

Inference

From the graph, the temperature decreases consistently from high temperature side.



RESULT

The given problem is solved using Workbench and Fluent and the results are drawn for different boundary conditions.

Meshing

1. Horizontal and vertical edges are meshed into 10 divisions and 1 division respectively
2. Face mesh is performed

Boundary Type Specification

Edge	*Name*	*Type*
Left	Left wall	Wall
Right	Right wall	Wall
Top	Top wall	Wall
Bottom	Bottom wall	Wall

1. The continuum is selected as solid
2. The mesh file is exported with export 2D mesh option selected
3. The mesh file is saved as plate mesh

Processor

1. The mesh file is read as a case file
2. The problem is selected as unsteady in the solver and the energy equation to find the temperature distribution for a required time is

$$\rho C_p \frac{\partial T}{\partial t} = K \frac{\partial^{\circledcirc} T}{\partial t^{\circledcirc}}$$

Boundary Conditions

1. The left wall are subjected to 273 K temperature, top and bottom to 0 K temperature
2. Material properties are changed as given in the problem
3. The solution is initialized from all zones where the initial temperature is applied as 473 K
4. The solution is converged by iterating process

Postprocessor

1. The graph is plotted between the length of plate on the x-axis and the static temperature at the top wall on y-axis
2. The solution is iterated for different time intervals
3. Comparative results are drawn

Inference

1. Right side temperature decreases with increase in time
2. At 275 seconds, the condition is changed to a steady state

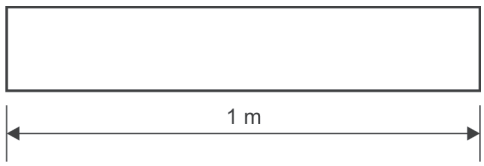
Experiment 7

External Flow over a Flat Plate

AIM

To solve the external flow over a flat plate problem by using Workbench and Fluent to study the result.

Problem Specification



A plate of 1 m 0.5 m size is taken the left wall is subjected to velocity and right wall to pressure.

PREPROCESSOR

Model Creation

1. Vertices are created using (0,0) (1,0) (1,0.5) and (0,0.5) coordinates
2. Edges are created using the vertices
3. Faces are created by selecting all the edges

Meshing

1. Horizontal and vertical edges are meshed into 50 divisions and 1 division respectively
2. Face mesh is performed

Boundary Type Specification

Edge	Name	Type
Left	Velocity inlet	Wall
Right	Pressure outlet	Wall
Airfoil	Wall	Wall

1. The continuum is selected as solid
2. The mesh file is exported with export 2D mesh option selected
3. The mesh file is saved as plate mesh

Boundary Conditions

1. The left wall is subjected to velocity of 1 m/s
2. The right wall is subjected to pressure as zero
3. Material properties are changed as given in the problem
4. The solution is converged by iterating process

Postprocessor

1. The graph is plotted between the length of plate on the x-axis and static temperature at the top wall on y-axis
2. The solution is iterated for different time intervals
3. Comparative results are drawn

Inference

The pressure and velocity distribution over the air foil is represented in the contours and the low pressure, high pressure and low velocity, high velocity regions are studied; also the lift convergence and drag convergence graph is plotted.