Chapter 4

Results & Conclusion

4.1 Results

The developed code is applied to a Square geometry meshed with triangular elements as shown in the figure. The mesh has 1800 triangular elements with 961 points.

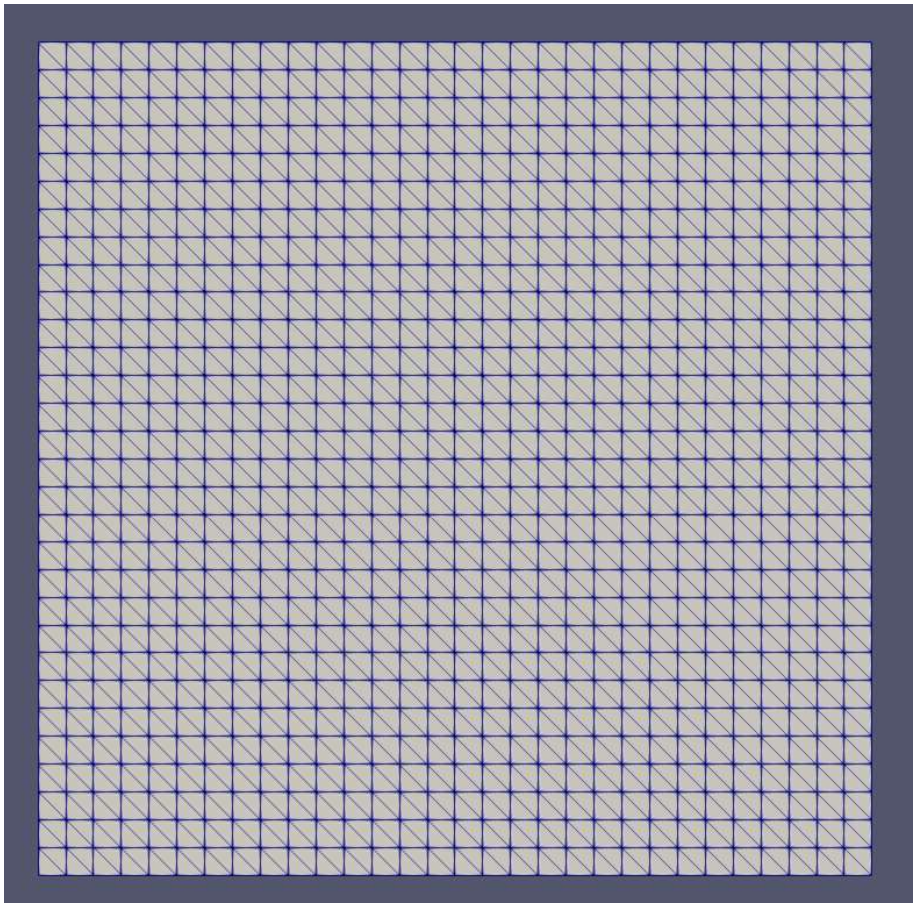

Figure 4.1: Square geometry with triangular mesh

Different boundary conditions are applied to test the code.

- Case 1: Bottom Const Temp 60, Right-Top-Left Const Temp 10
- Case 2: Bottom Const Temp 60, Right Convection Exter Temp 100, Top Insulation, Left Const Temp 10
- Case 3: Bottom Const Temp 60, Right Covection Exter Temp 100, Top Insulation, Left Insulation
- Case 4: Bottom Insulation, Right Covection Exter Temp 100, Top Insulation, Left Const Temp 60

The steady state temperature contour plots for all the four cases are shown below.

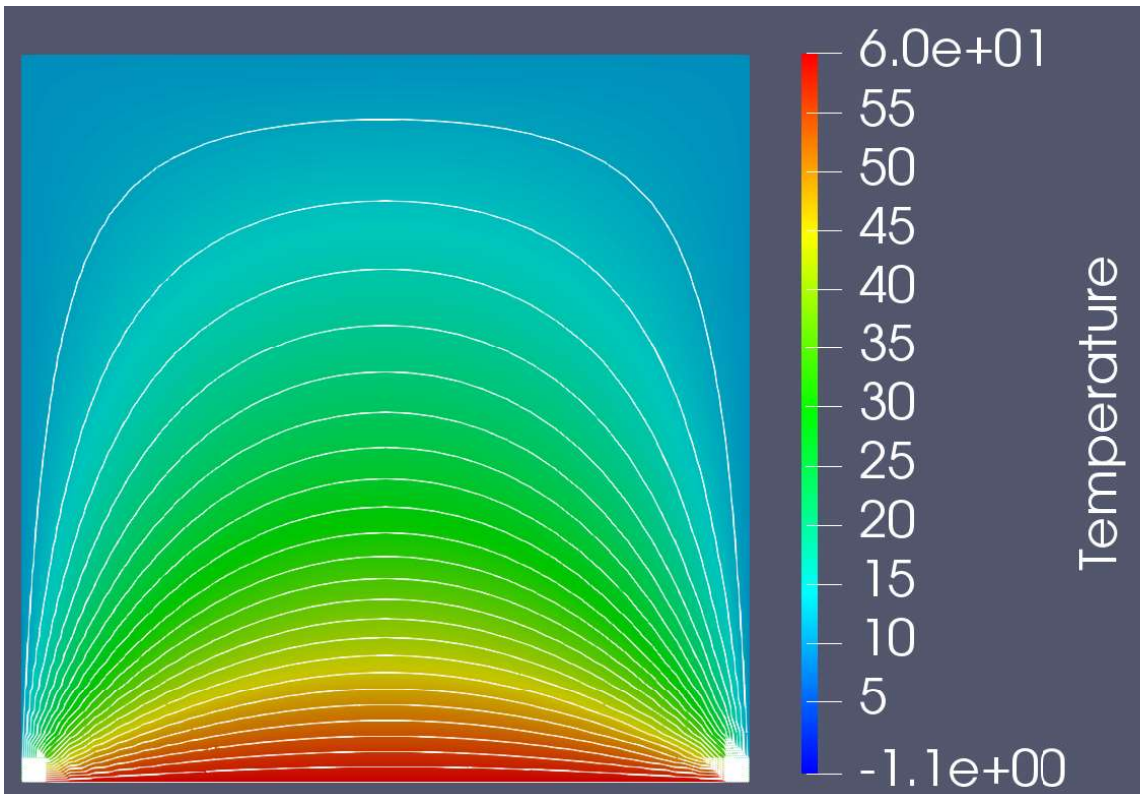

Figure 4.2: Contour plot for Case 1

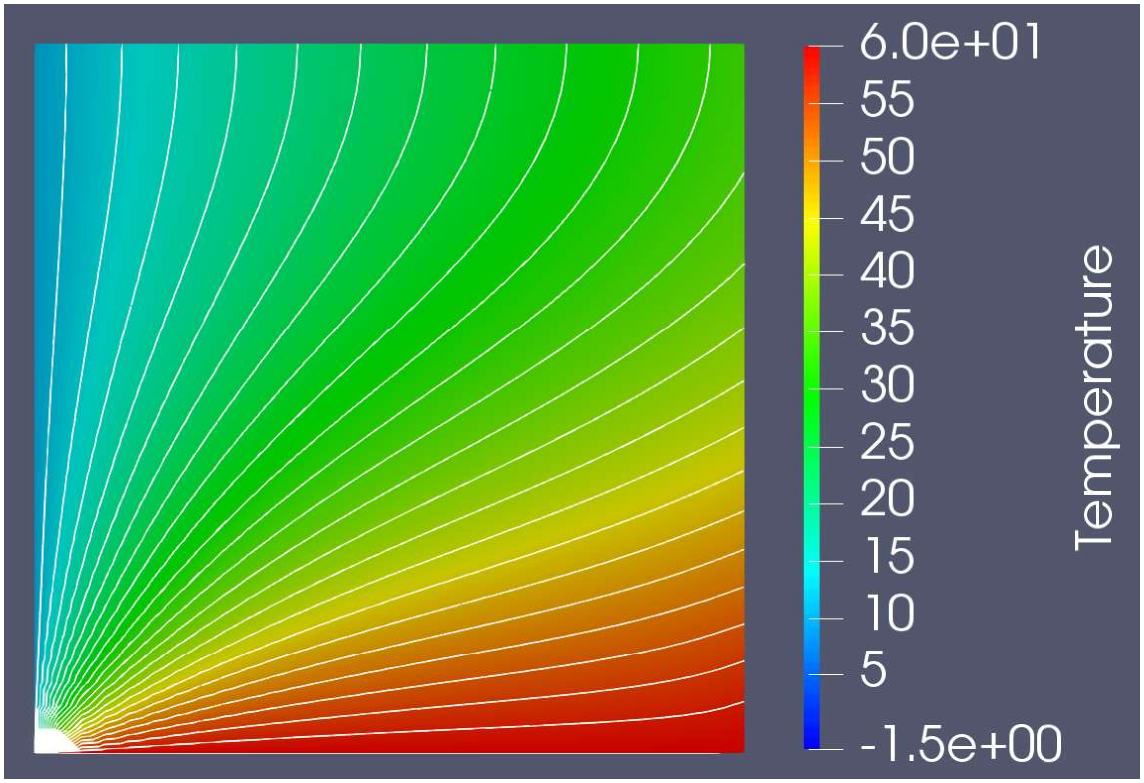

Figure 4.3: Contour plot for Case 2

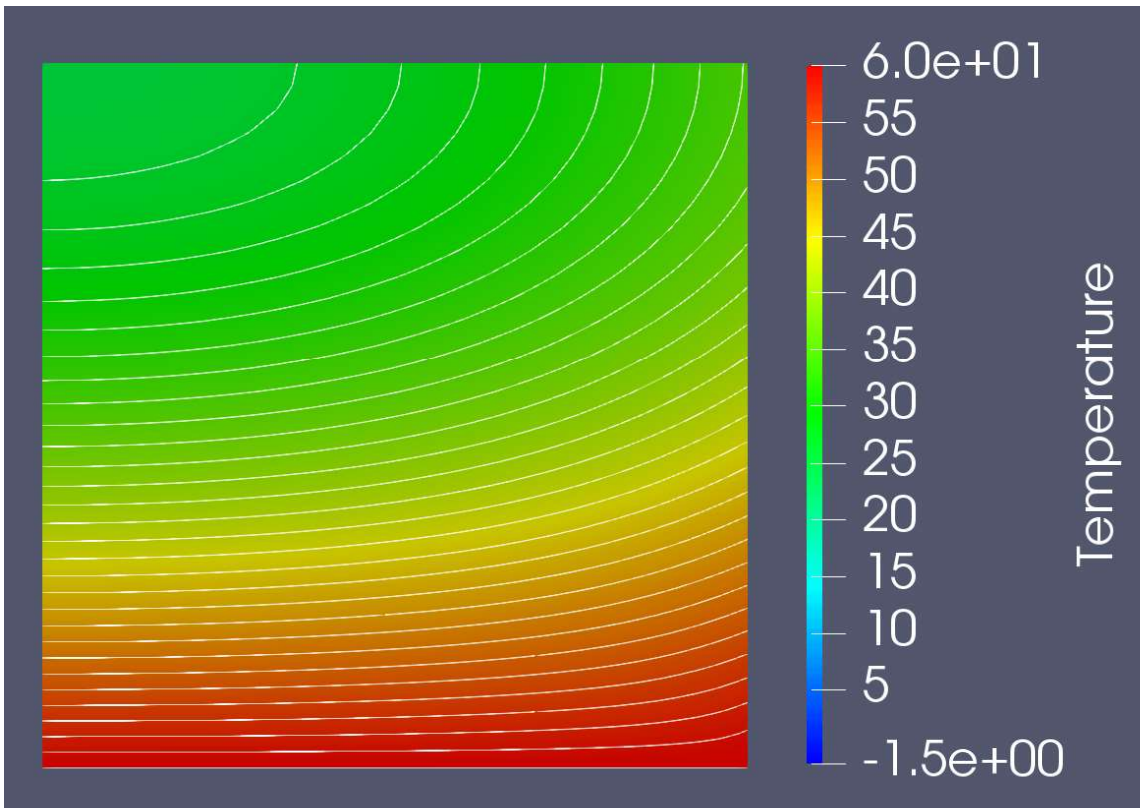

Figure 4.4: Contour plot for Case 3

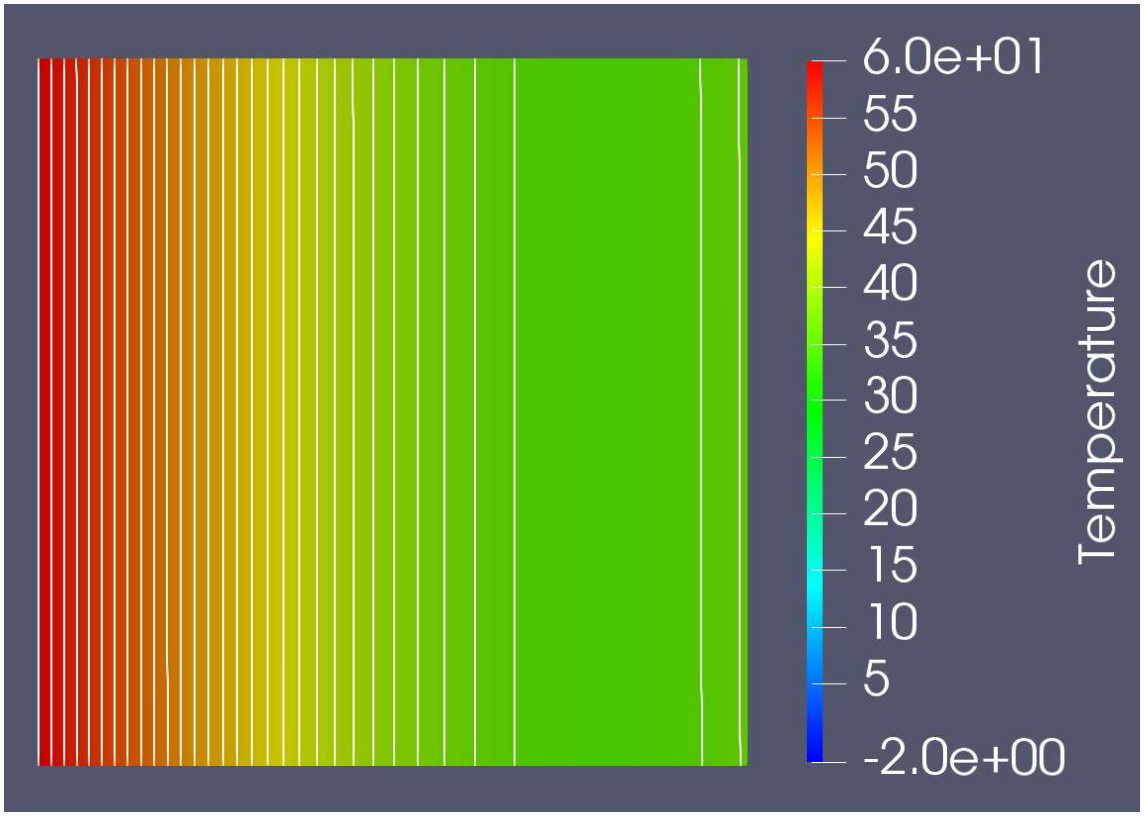

Figure 4.5: Contour plot for Case 4

4.2 Conclusion

Here we can see that the code works well for different cases. We can also observe where ever the insulation boundary is present the temperature contours end normally into that boundary which further verifies the correctness of code. Thus a object oriented c++ code for transient heat conduction is successfully developed. This code can handle triangular meshes of any arbitrary 2-d geometry with different boundary conditions like Convection, Constant Temperature, Heat flux. It outputs solution in .vtk format at different time steps which can viewed as an animation in paraview.