SU2 8주차 보고서

2019011579 김세형

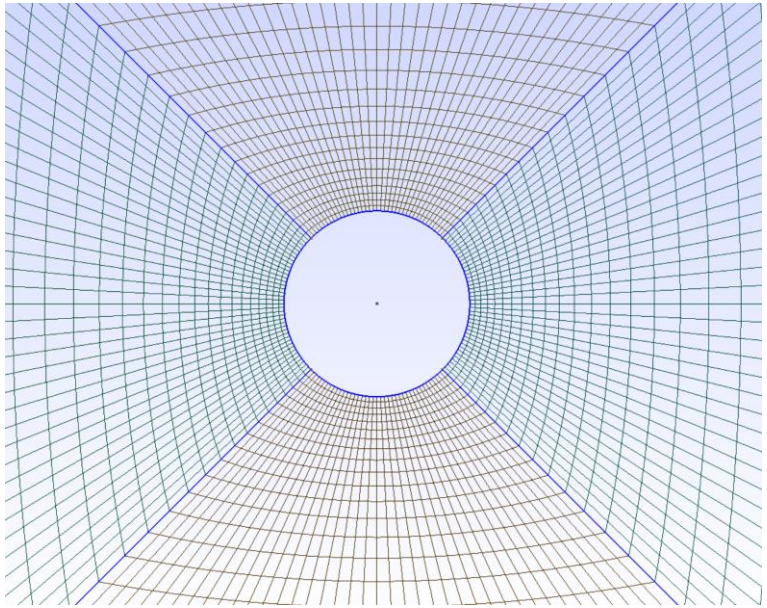
Cyl

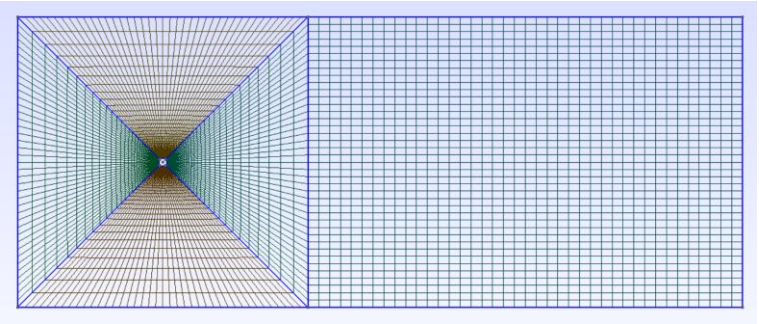
Simulation Condition & Mesh

Simulation Condition

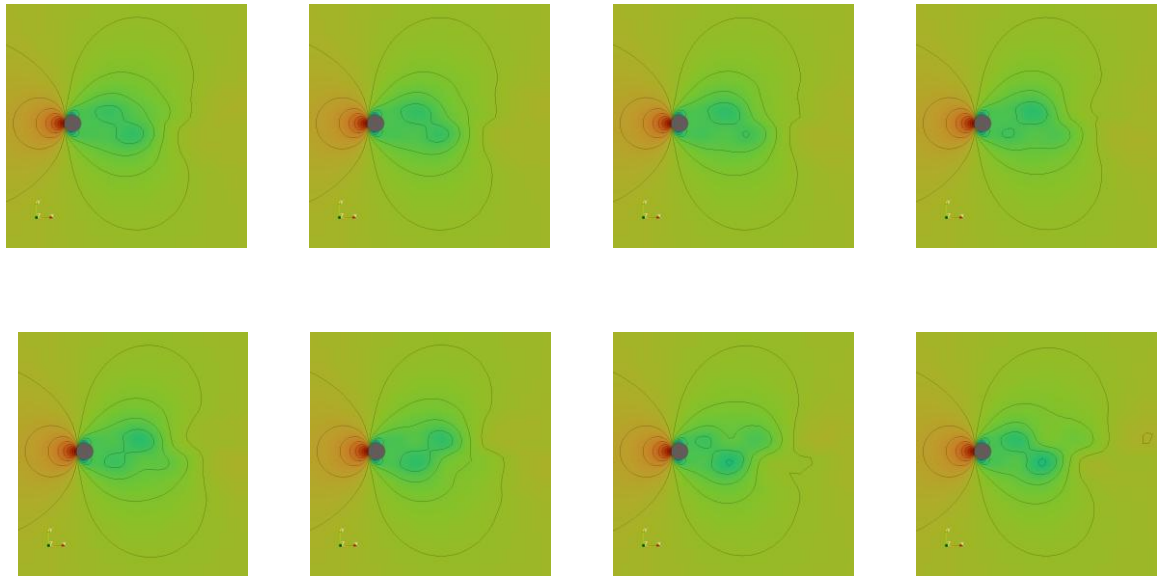
- UNSTEADY SIMULATION
  - TIME_STEP= 0.01
  - MAX_TIME=25. 00
- BOUNDARY CONDITION DEFINITION
  - MARKER_HEATFLUX= (wall, 0.0)
  - MARKER_FAR= (inlet, outlet, top, bottom)
  - MARKER_MONITORING= (wall)
- INPUT/OUTPUT INFORMATION
  - OUTPUT_FILES= (RESTART, PARAVIEW)
  - OUTPUT_WRT_FREQ= (1000, 10)

Mesh





Pressure Contour



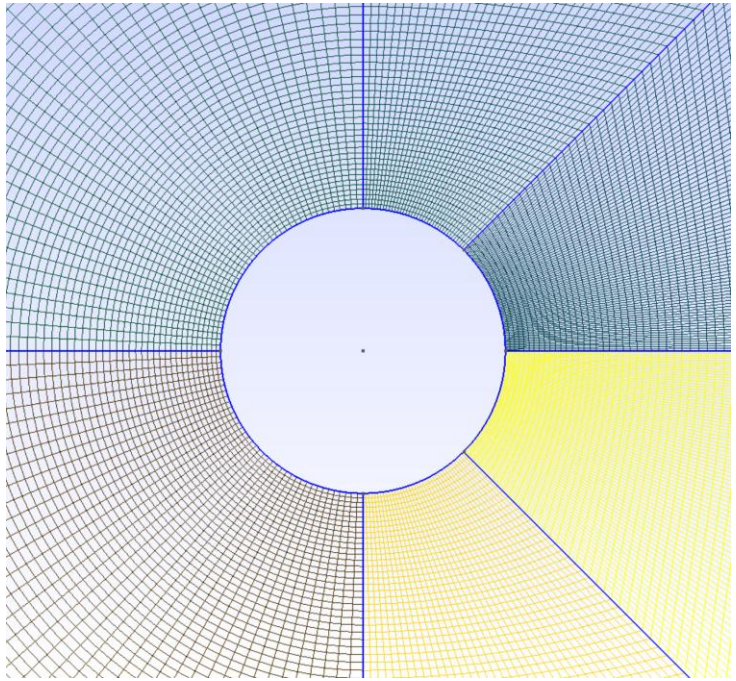
Cylinder Wake

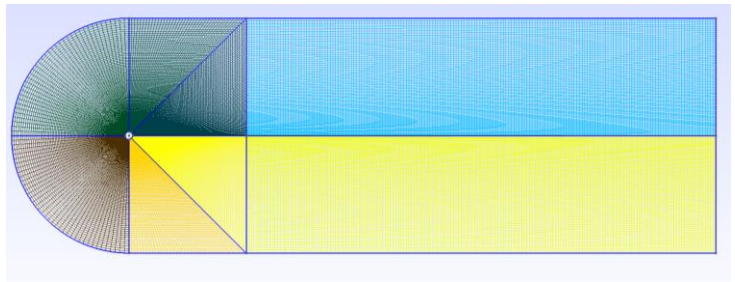
Simulation Condition & Mesh

Simulation Condition

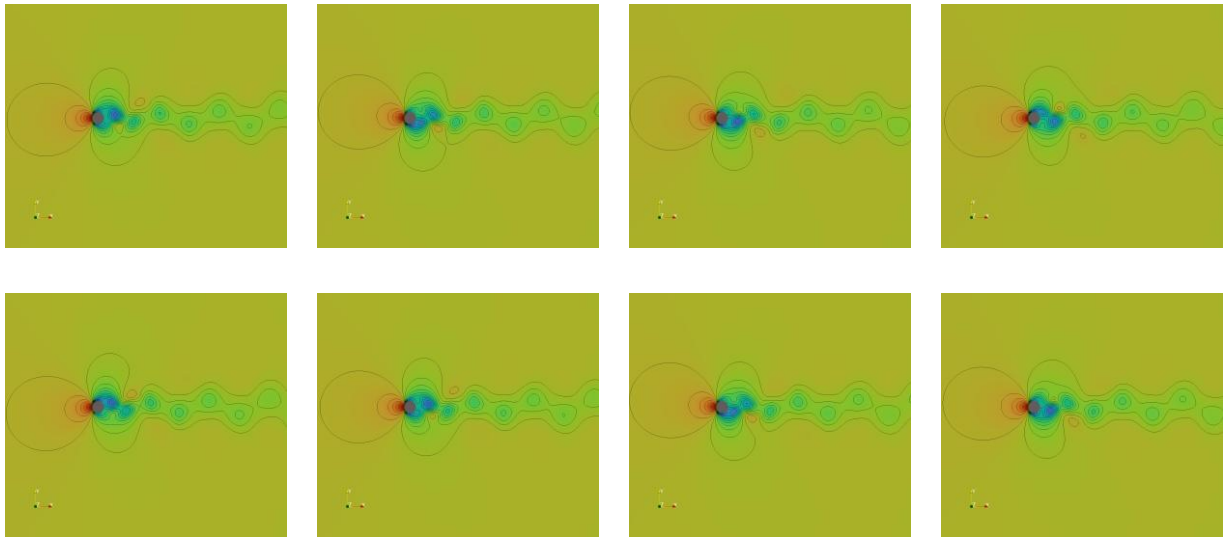
- UNSTEADY SIMULATION
  - TIME_STEP= 0.01
  - MAX_TIME=25. 00
- BOUNDARY CONDITION DEFINITION
  - MARKER_HEATFLUX= (cylinder, 0.0)
  - MARKER_FAR= (farfield_in,farfield_side,farfield_out)
  - MARKER_MONITORING= (cylinder)
- INPUT/OUTPUT INFORMATION
  - OUTPUT_FILES= (RESTART, PARAVIEW)
  - OUTPUT_WRT_FREQ= (1000, 10)

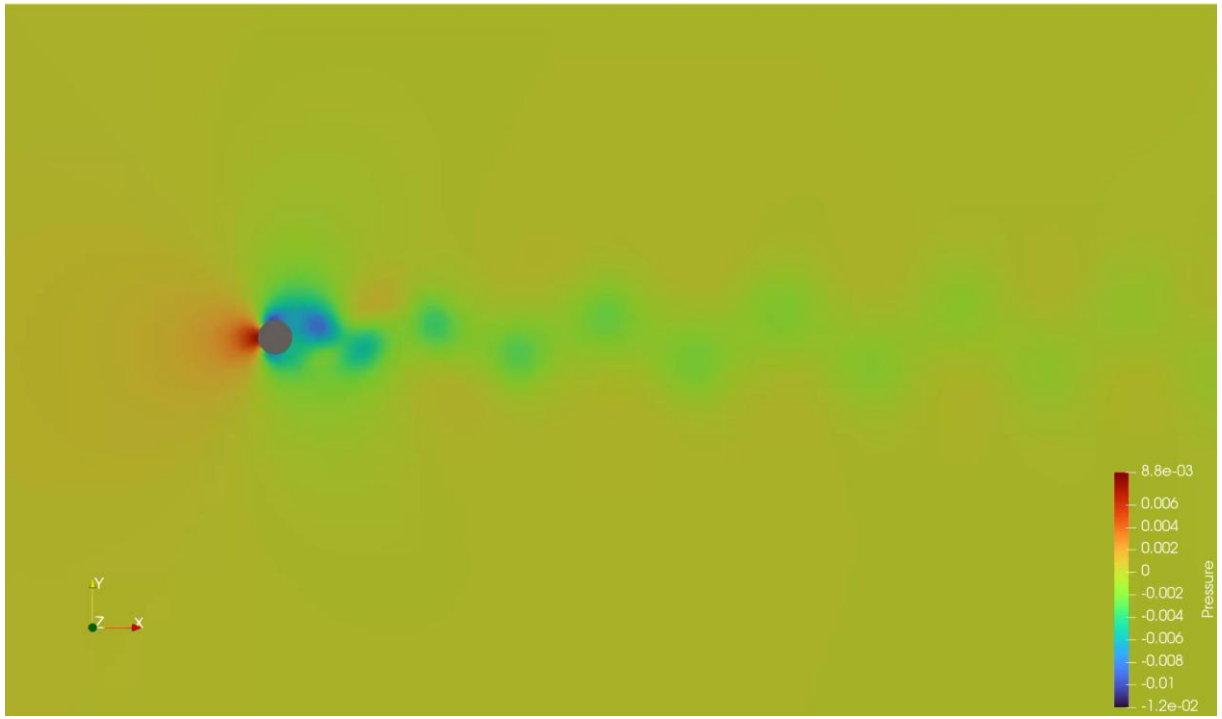
Mesh





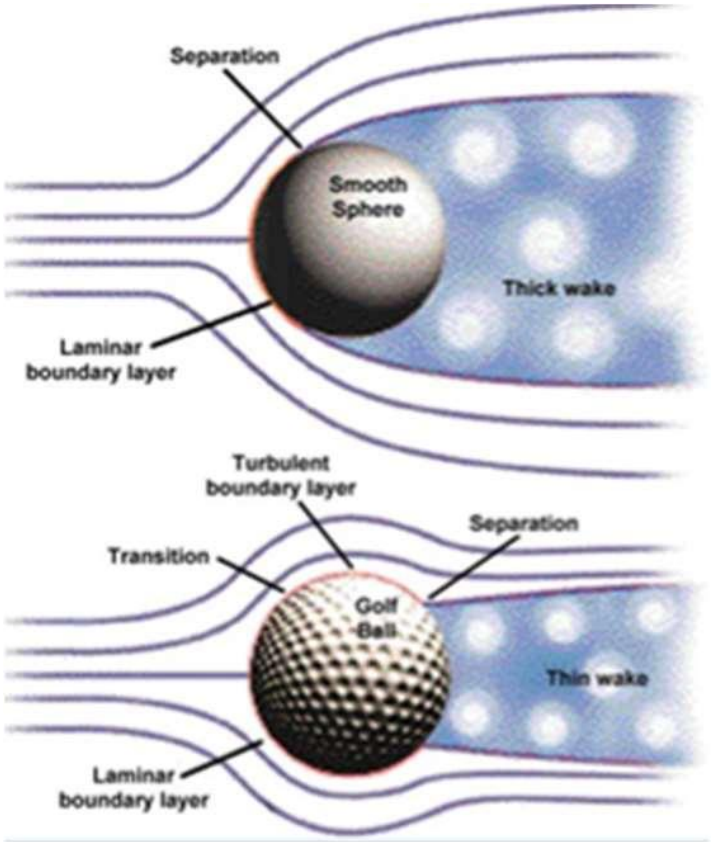
Pressure Contour





Analisys

- 원형 단면 주위에 경계층이 형성되며, 형상 후방의 박리점에서 경계층이 분리.
- 분리된 유동은 단면 뒤쪽에서 와류를 형성하며, 이로 인해 후류 영역이 발생.
- 박리 영역 내에서는 상대적으로 낮은 압력이 형성.
- 이때 원형 단면 전·후면의 압력 차이에 의해 압력항력(Pressure drag)이 발생하며, 이는 전체 항력의 대부분을 차지.
- 표면에서 발생하는 마찰항력(Surface friction drag)은 상대적으로 매우 작으며, 결과적으로 압력항력이 원형 단면의 항력 특성을 지배.



Unsteady Pitch

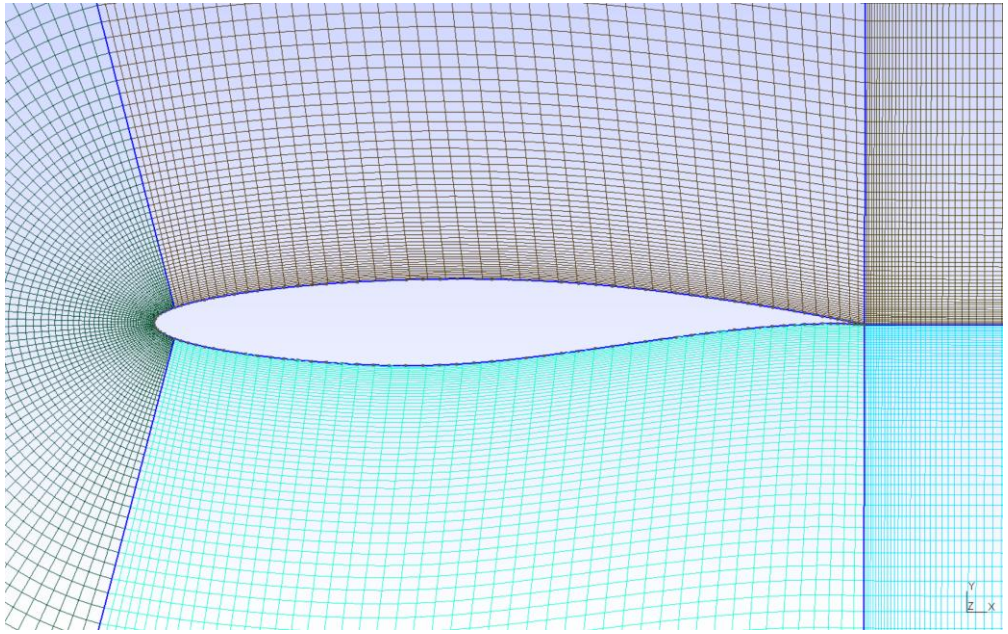
RAE2822

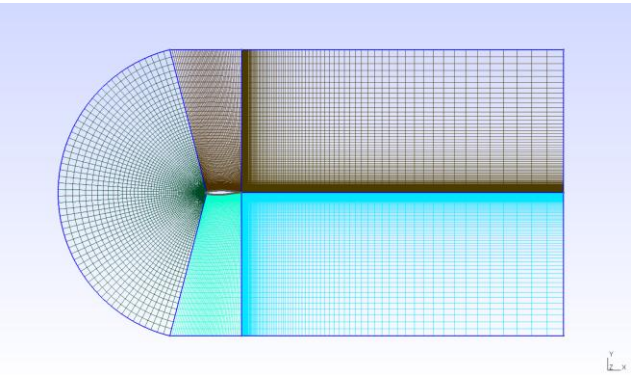
Simulation Condition & Mesh

Simulation Condition

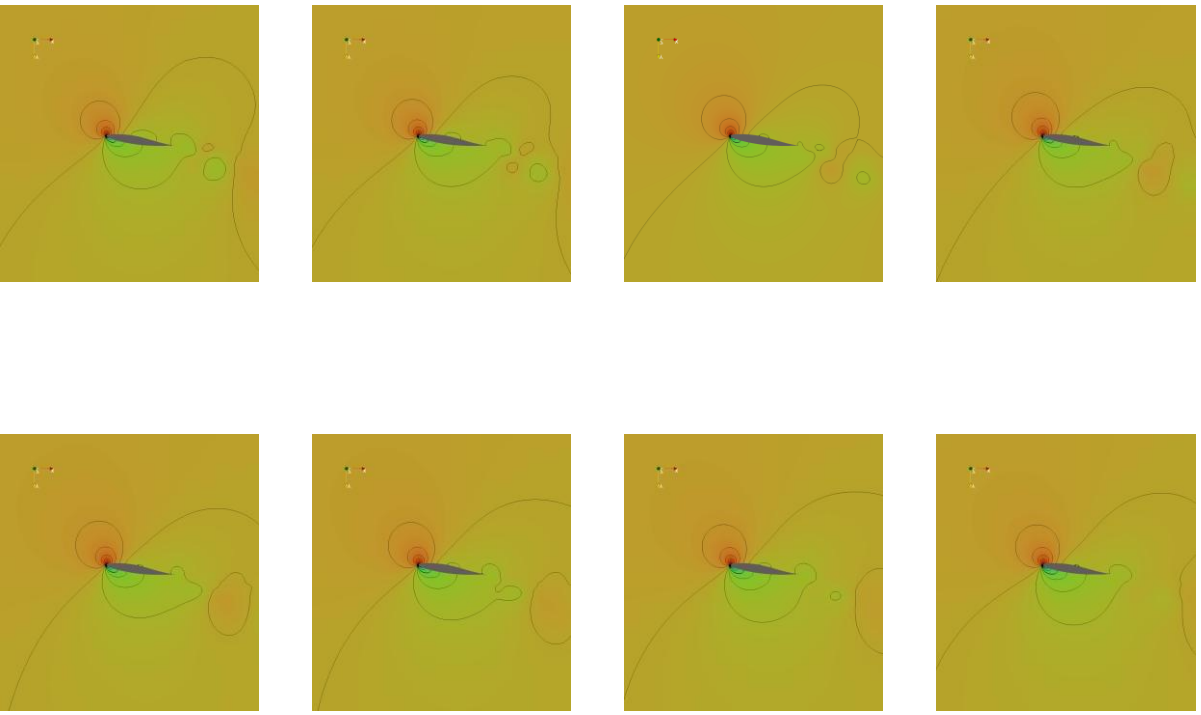
- COMPRESSIBLE FREE-STREAM
  - MACH_NUMBER= 0.3
  - AOA= 17.0
- BOUNDARY CONDITIONS
  - MARKER_HEATFLUX= (airfoil, 0.0)
  - MARKER_FAR= (farfield)
  - MARKER_PLOTTING= (airfoil)
  - MARKER_MONITORING= (airfoil)
- PITCHING MOTION PARAMETERS
  - GRID_MOVEMENT= RIGID_MOTION
  - MOTION_ORIGIN=(0.25,0.0,0.0)
  - PITCHING_AMPL=(0.0,0.0,8.0)
  - PITCHING_OMEGA=(0.0,0.0,14.91675)
- TIME CONVERGENCE
  - TIME_ITER= 2000
- INPUT/OUTPUT
  - OUTPUT_FILES= (RESTART, PARAVIEW)
  - OUTPUT_WRT_FREQ= (1, 1)

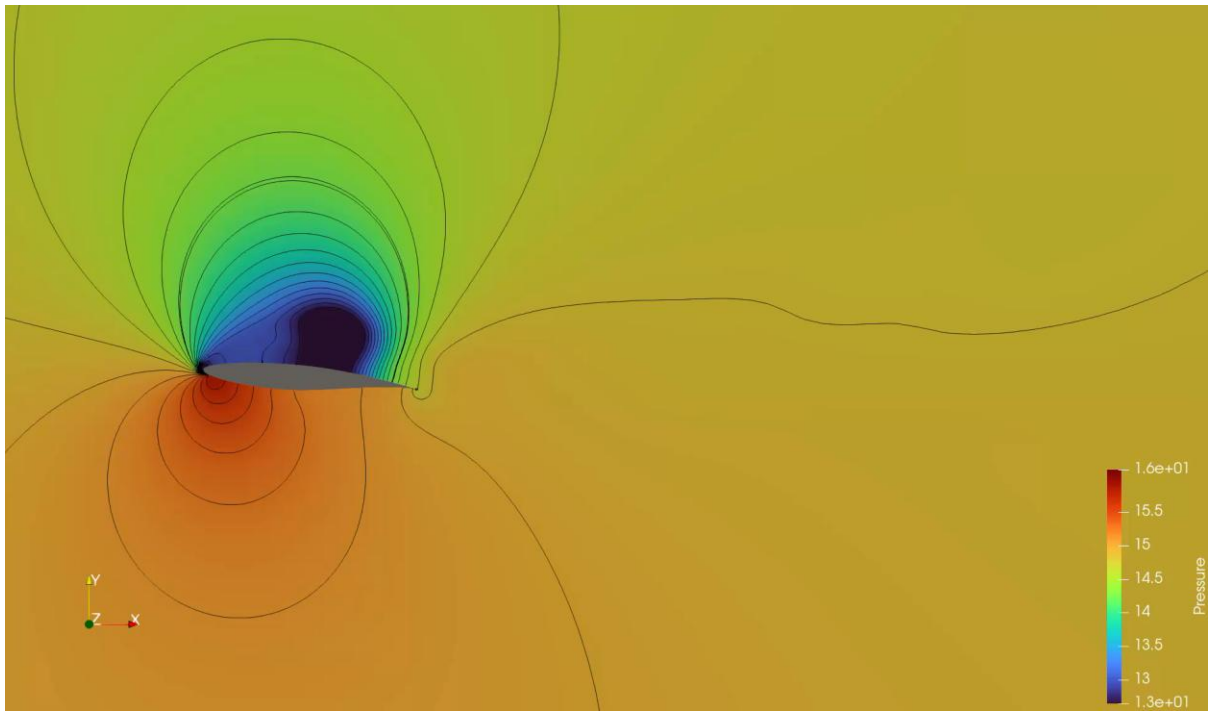
Mesh





Pressure Contour





Unsteady Pitch

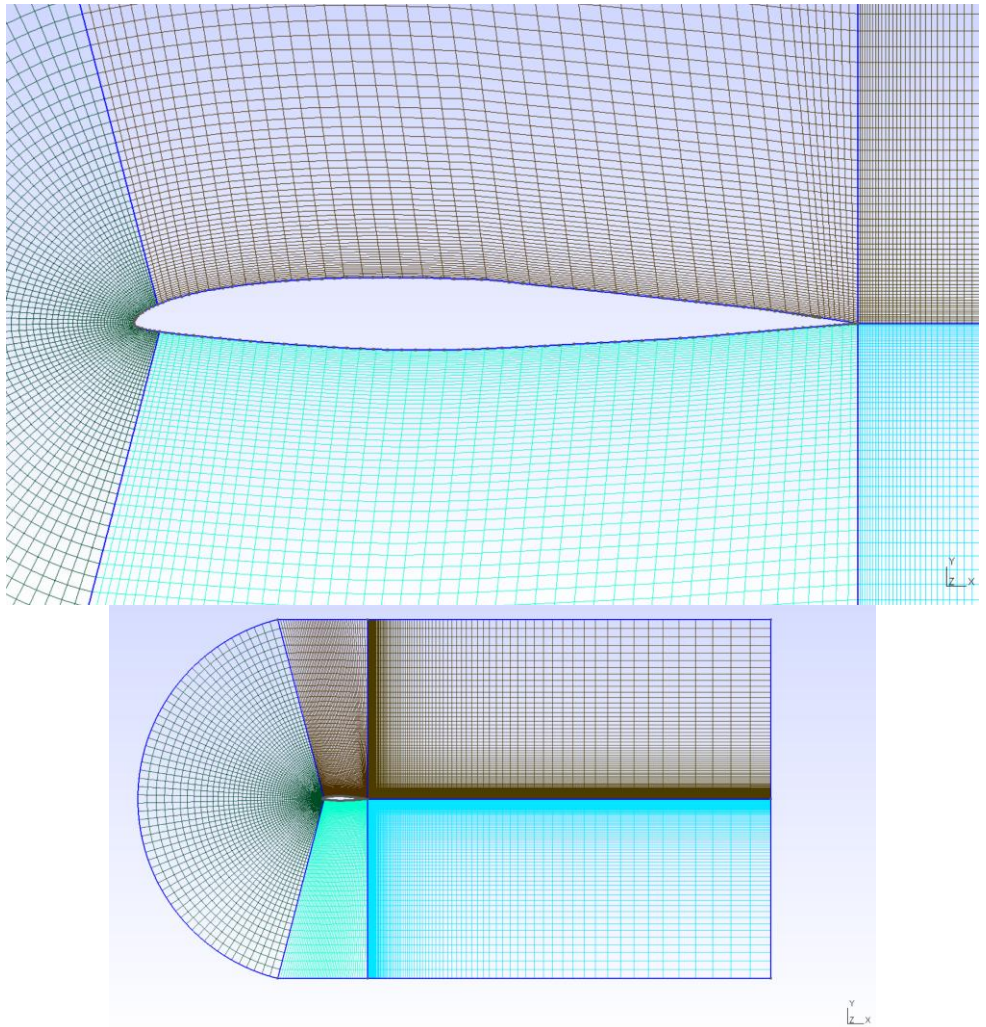
b737c-il

Simulation Condition & Mesh

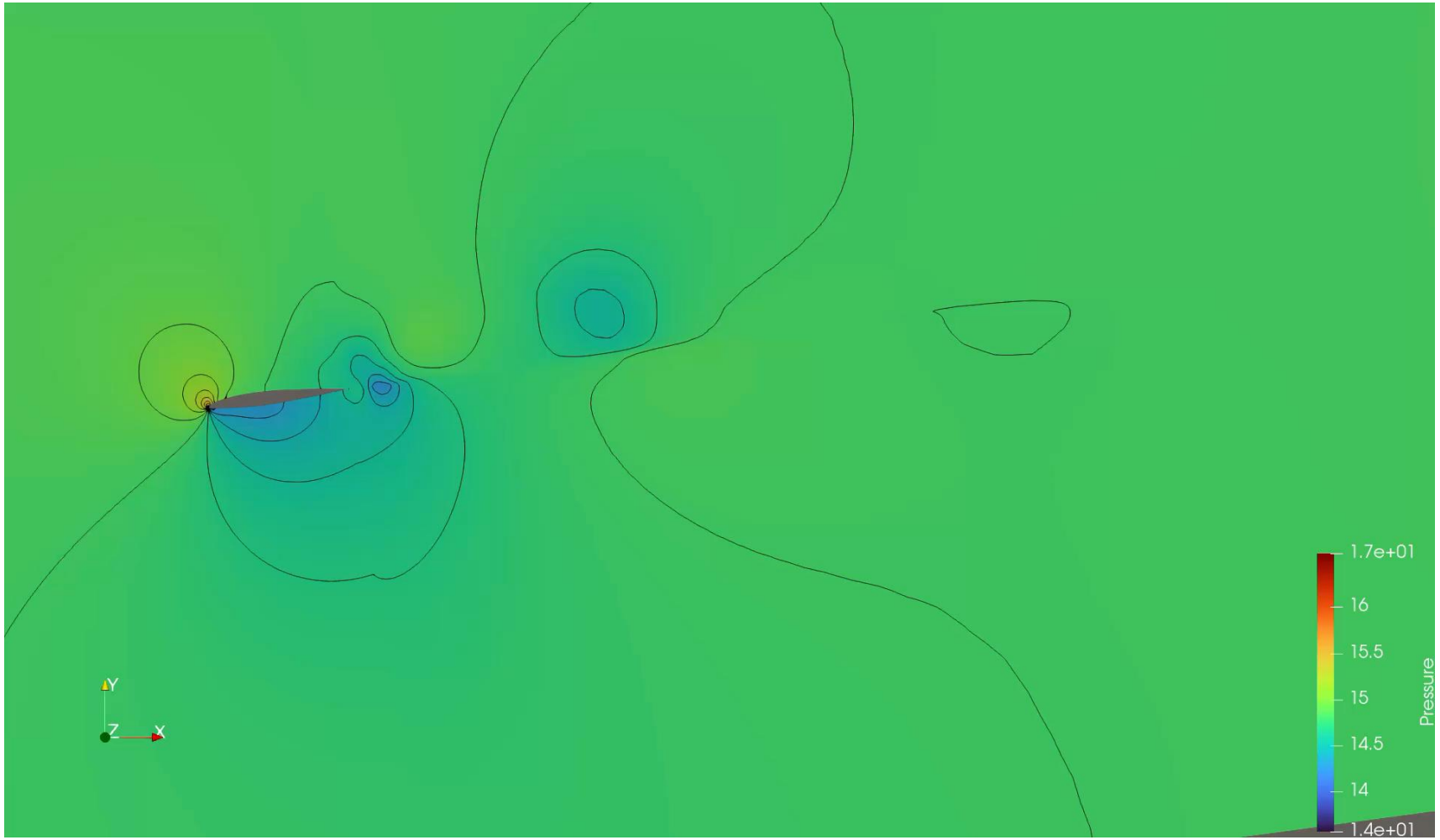
Simulation Condition

- COMPRESSIBLE FREE-STREAM
  - MACH_NUMBER= 0.3
  - AOA= 6.0
- BOUNDARY CONDITIONS
  - MARKER_HEATFLUX= (airfoil, 0.0)
  - MARKER_FAR= (farfield)
  - MARKER_PLOTTING= (airfoil)
  - MARKER_MONITORING= (airfoil)
- PITCHING MOTION PARAMETERS
  - GRID_MOVEMENT= RIGID_MOTION
  - MOTION_ORIGIN=(0.25,0.0,0.0)
  - PITCHING_AMPL=(0.0,0.0,10.0)
  - PITCHING_OMEGA=(0.0,0.0,20)
- TIME CONVERGENCE
  - TIME_ITER= 1000
- INPUT/OUTPUT
  - OUTPUT_FILES= (RESTART, PARAVIEW)
  - OUTPUT_WRT_FREQ= (1, 1)

Mesh



Pressure Contour



Analisys

- 에어포일 상면에서 강한 저압 영역이 주기적으로 형성되며, 피칭 운동에 따라 이동함.
- 앞전(Leading edge) 부근에서 발생한 와류(leading-edge vortex) 가 시간에 따라 발달 및 이동.
- 받음각이 증가하는 구간에서는 유동이 앞전에서 박리되며, 비정상적인 압력 구배 변화가 나타남.