



REPORT

학과: 항공기계공학과
과목: 전산유체해석실습
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교수: 임동균 교수님
제출날짜: 11/12 (수)



CHEONGJU UNIVERSITY

Pitching&Plunging

RAE2822

pitching_plunging

```
Performing rigid mesh transformation.  
New physical time: 1.00087 seconds.
```

Time_Iter	Inner_Iter	rms[Rho]	relrms[Rho]	CDI	CL Cauchy[tavg[Cauchy[tavg[CL Cauchy[tavg[Cauchy[tavg[CL Cauchy[tavg[Cauchy[tavg[
425	0	-5.039496	0.000000	3.231834	8.555131	1.0000e+00	1.0000e+00
425	9	-5.662714	-0.623218	3.257022	8.603897	1.0000e+00	1.0000e+00

```
----- Solver Exit -----  
maximum time reached (MAX_TIME = 1s).
```

File Writing Summary	Filename
SU2 binary restart	restart_flow_00425.dat
Paraview	flow_00425.vtu

```
% COMPRESSIBLE FREE-STREAM  
%  
MACH_NUMBER= 0.3  
AOA= 17.0  
FREESTREAM_TEMPERATURE= 293.0  
FREESTREAM_PRESSURE= 101325.0  
REYNOLDS_NUMBER= 1000.0  
REYNOLDS_LENGTH= 1.0
```

```
% 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=(0.0,0.0,0.8,0)  
PITCHING_OMEGA=(0.0,0.0,0.14.91675)  
PLUNGING_OMEGA= 0.0 106.69842 0.0  
PLUNGING_AMPL= 0.0 1.01 0.0
```

```
% INNER CONVERGENCE  
%  
INNER_ITER= 10  
CONV_FIELD= REL_RMS_DENSITY  
CONV_RESIDUAL_MINVAL= -3  
CONV_STARTITER= 0
```

```
% TIME CONVERGENCE  
%  
TIME_ITER= 2000  
--  
% INPUT/OUTPUT  
OUTPUT_FILES= ( RESTART, PARAVIEW )  
OUTPUT_WRT_FREQ= ( 1, 1 )
```

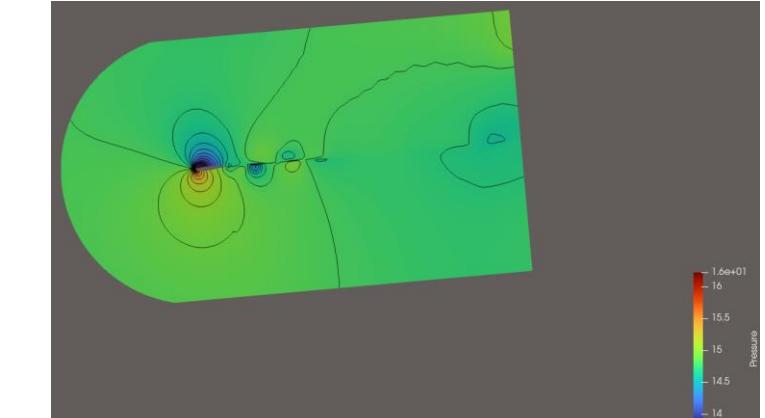
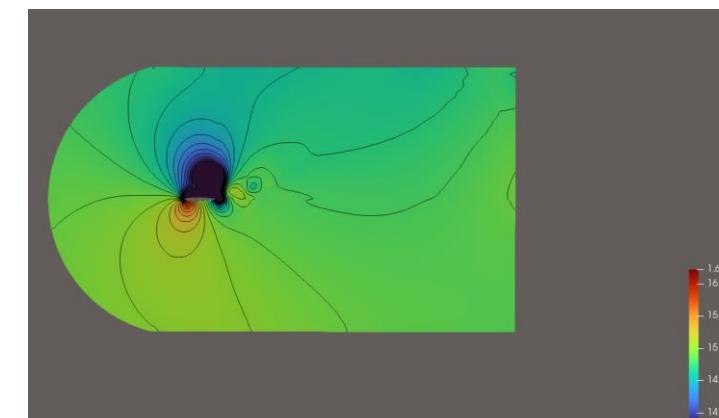
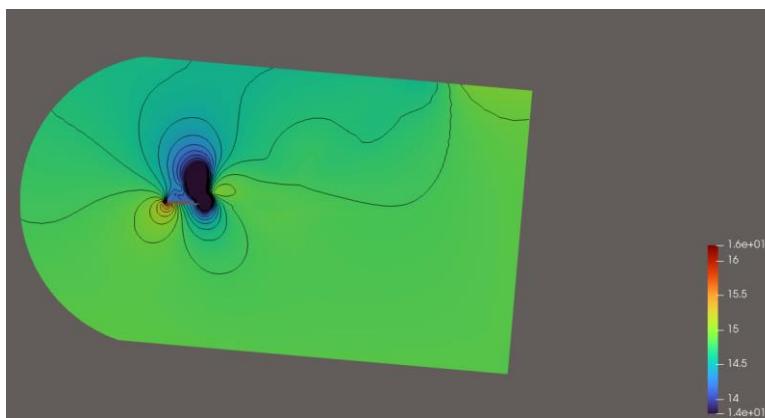
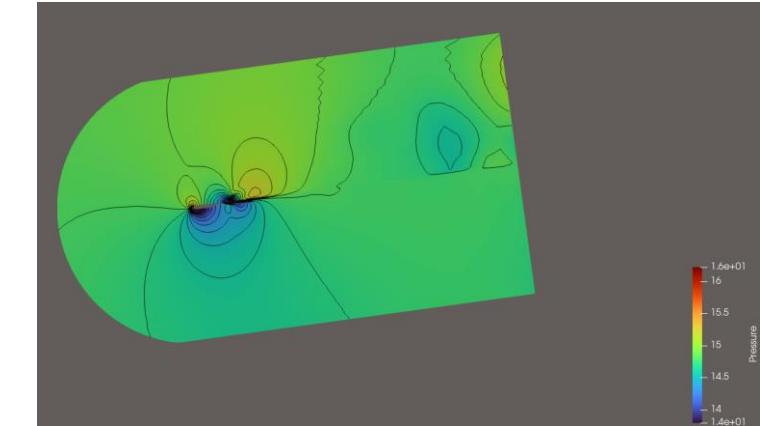
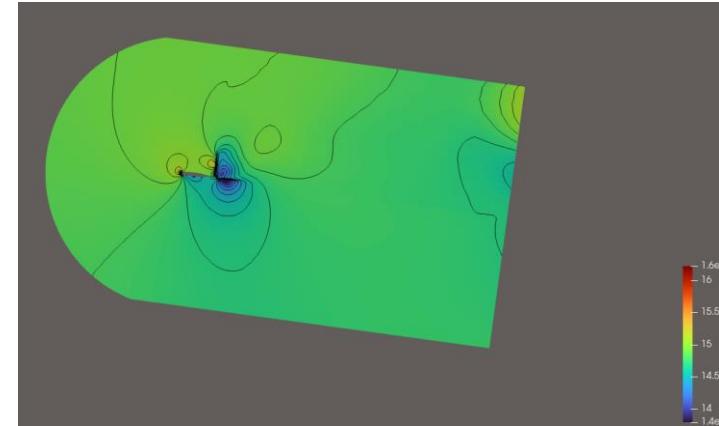
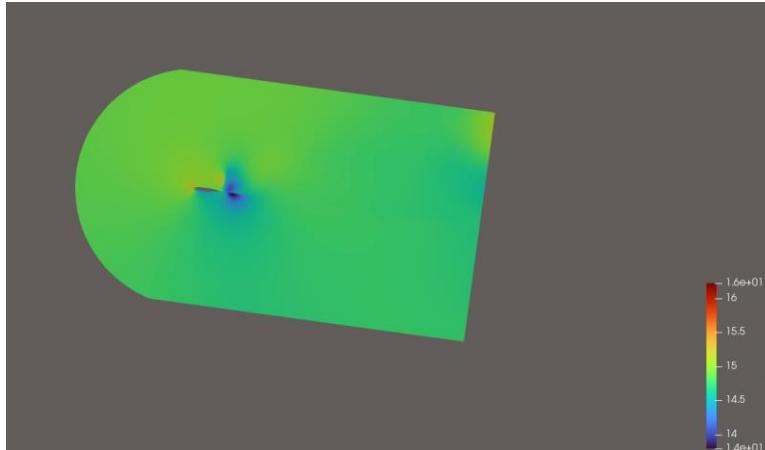
pitching_plunging

Airfoil이 하강(plunging) 운동을 할 때 상면에서는 유속이 급격히 증가하여 강한 저압 영역이 형성되고, 이 저압은 시간에 따라 뒷전 방향으로 이동한다.

반대로 상방 운동 시에는 하면에 저압, 상면에 고압이 생기지만 압력 변화폭은 하강 시보다 작다.

이러한 압력 분포의 비대칭성으로 인해 후류에서도 상하 방향의 유동이 비대칭적으로 나타나며, 와류 구조와 압력 분포가 불균형하게 형성된다.

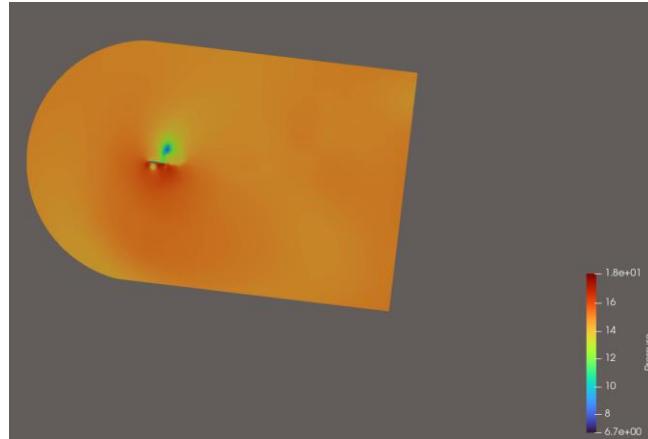
이는 비정상 공력 특성에 기인한 현상이다.



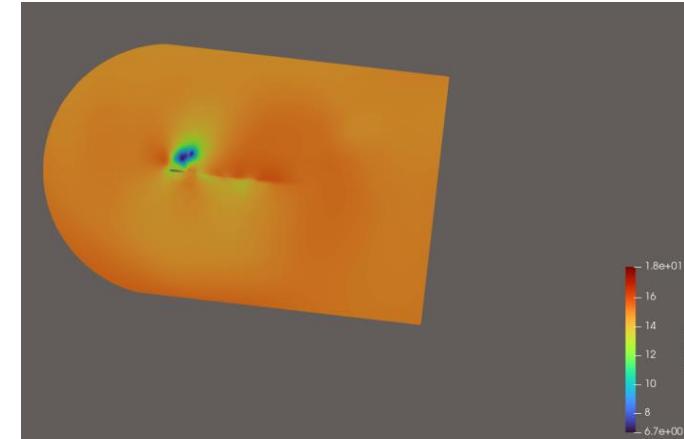
Pitching&Plunging

NACA0012

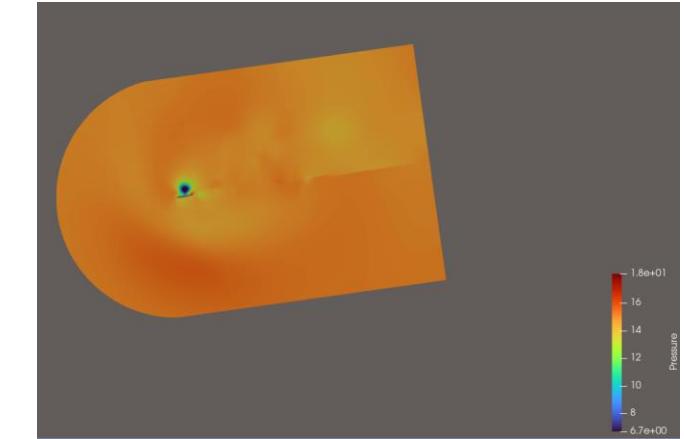
pitching_plunging



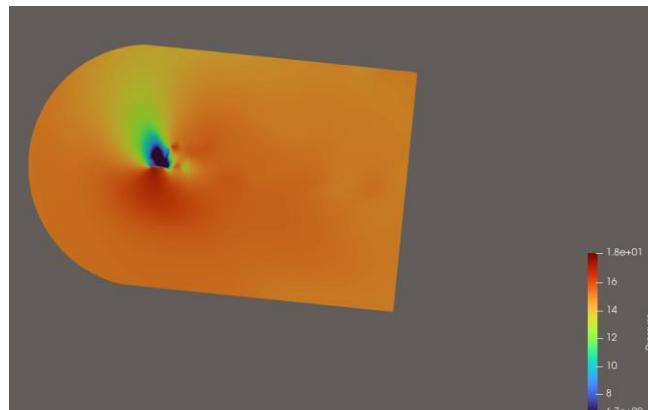
0s



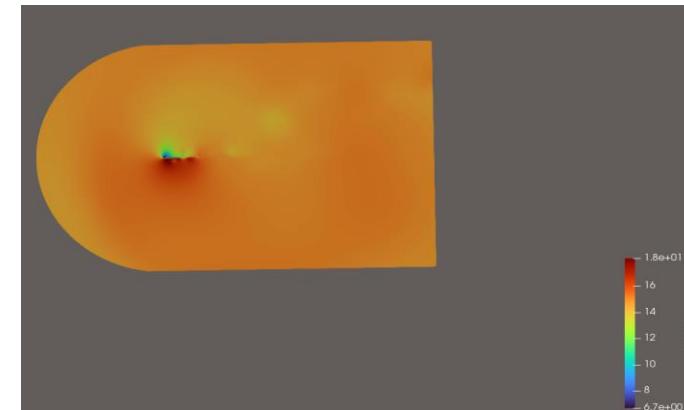
70s



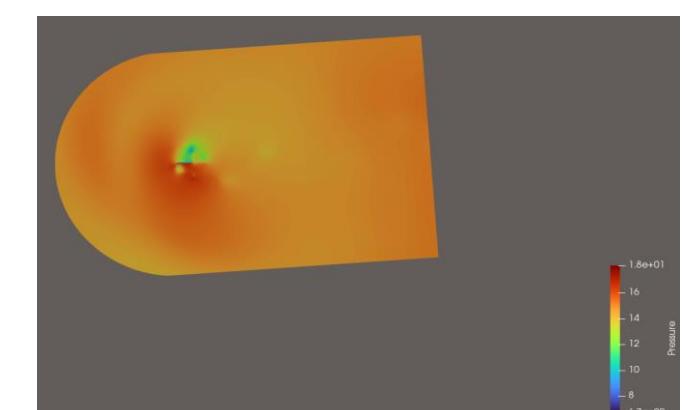
140s



210s



280s



350s

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```
% ----- COMPRESSIBLE AND INCOMPRESSIBLE FREE-STREAM DEFINITION -----%
%
MACH_NUMBER= 0.0
AOA= 0.0
SIDESLIP_ANGLE= 0.0
FREESTREAM_PRESSURE= 101325.0
FREESTREAM_TEMPERATURE= 288.15

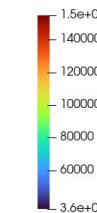
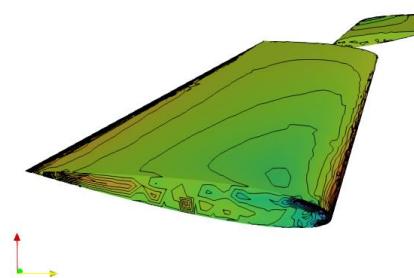
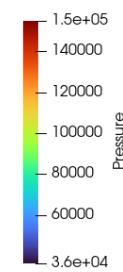
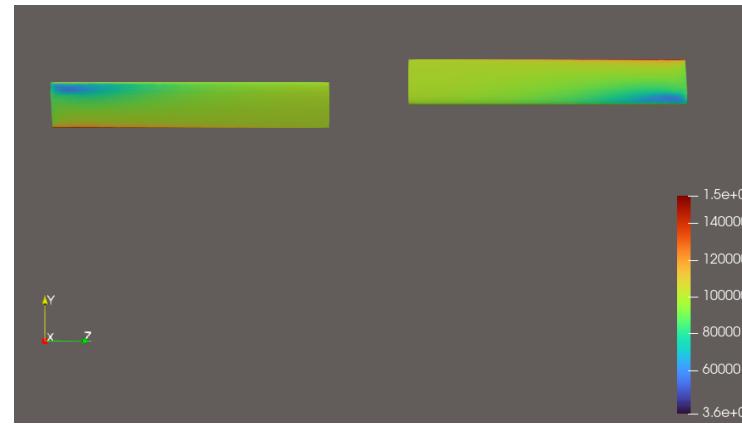
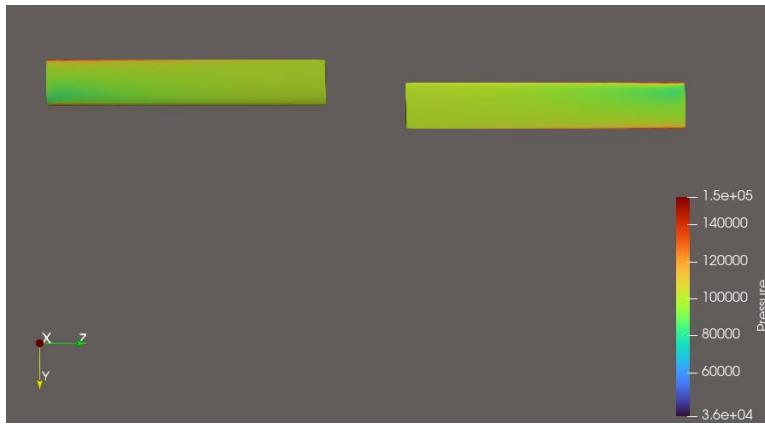
% ----- DYNAMIC MESH DEFINITION -----%
%
GRID_MOVEMENT= ROTATING_FRAME
MACH_MOTION= 0.877
MOTION_ORIGIN= 0.0 0.0 0.0
ROTATION_RATE = 261.799.0 0.0 0.0

% ----- BOUNDARY CONDITION DEFINITION -----%
%
MARKER_EULER= ( blade_1, blade_2 )
MARKER_FAR= ( farfield )

% ----- SURFACES IDENTIFICATION -----%
%
MARKER_PLOTTING = ( blade_1, blade_2 )
MARKER_MONITORING = ( blade_1, blade_2 )
%MARKER_DESIGNING = ( airfoil )

% ----- MULTIGRID PARAMETERS -----%
%
MGLEVEL= 3
MGCYCLE= W_CYCLE
MG_PRE_SMOOTH= ( 1, 2, 3, 3 )
MG_POST_SMOOTH= ( 0, 0, 0, 0 )
MG_CORRECTION_SMOOTH= ( 0, 0, 0, 0 )
MG_DAMP_RESTRICTION= 0.95
MG_DAMP_PROLONGATION= 0.95
```

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