

전산유체해석실습 과제 (10주차)

과목명 : 전산유체해석실습

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학과 : 항공기계공학과

학번 : 2021010530

이름 : 박진우

제출일 : 25-11-20

ONERA M6 Wing Case 2565

- Condition

- $M_\infty = 0.84$
- $Re_{c_root} = 14.6 \times 10^6$
- $AOA = 6.06^\circ$
- $T_\infty = 540R$
- $Re_{MAC} = 11.71 \times 10^6$

```
cfg
% for initializing the solution (REYNOLDS, TD_CONDITIONS)
INIT_OPTION= REYNOLDS
% Mach number (non-dimensional, based on the free-stream values)
MACH_NUMBER= 0.8372
%
% Angle of attack (degrees, only for compressible flows)
AOA= 6.06
% Reynolds number (non-dimensional, based on the free-stream values)
REYNOLDS_NUMBER= 11.71E6
```

- Cp data for 7 span stations

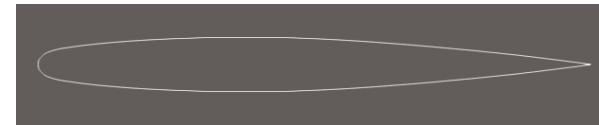
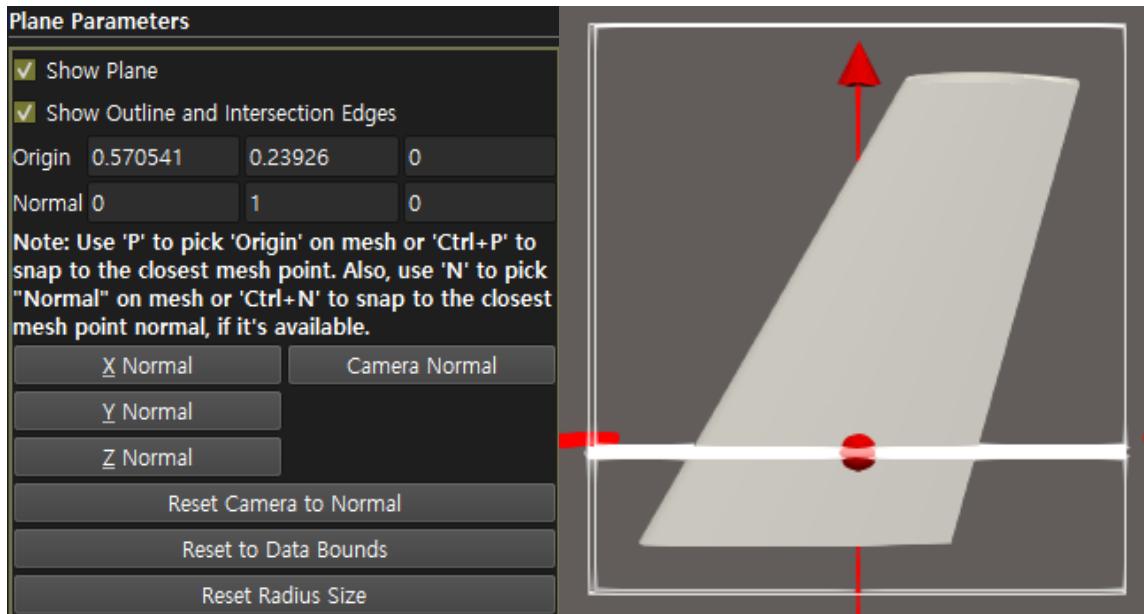
$y/b = 0.2, 0.44, 0.65, 0.8, 0.9, 0.96, \text{ and } 0.99$
($b = \text{Semispan}$ (last section): 1.196300000084 m)

y/b	0.2 (Section 1)	0.44 (Section 2)	0.65 (Section 3)	0.8 (Section 4)	0.9 (Section 5)	0.96 (Section 6)	0.99 (Section 7)
y	0.2392600000168	0.5263720000369	0.7775950000546	0.9570400000672	1.0766700000756	1.1484480000806	1.1843370000831

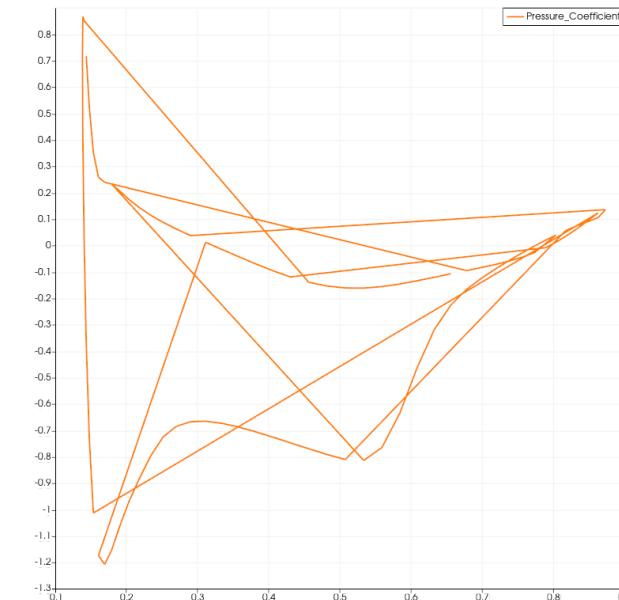
$Y/b = 0.2$ (Section 1)

- Slice

$Y= 0.23926000000168$

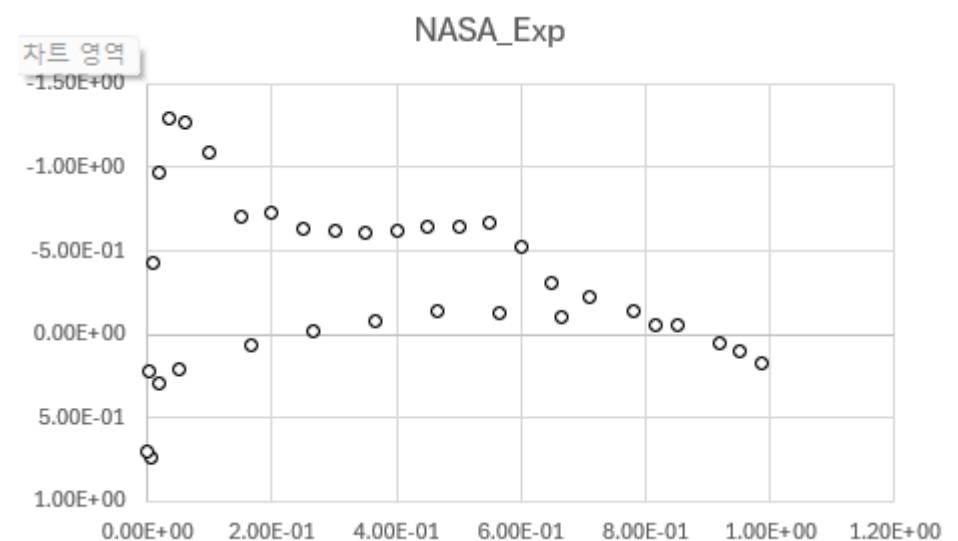
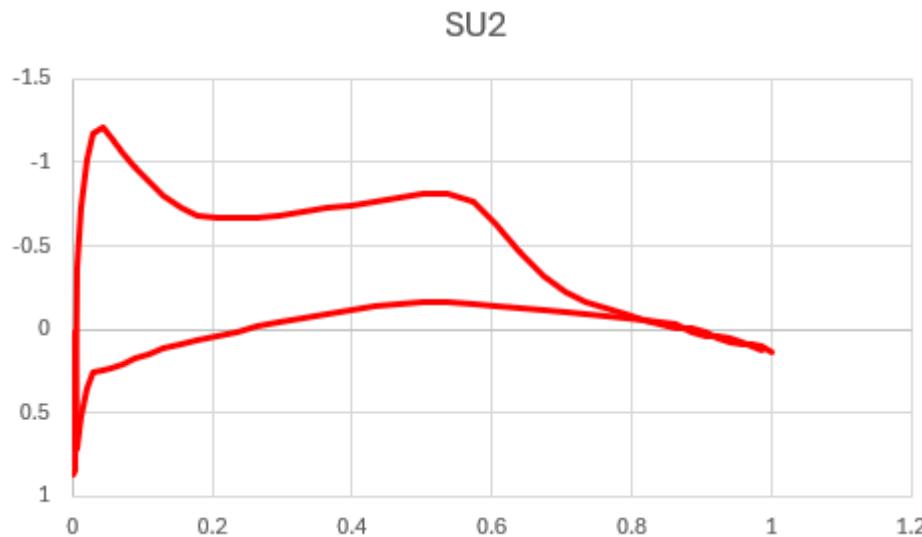


C_p



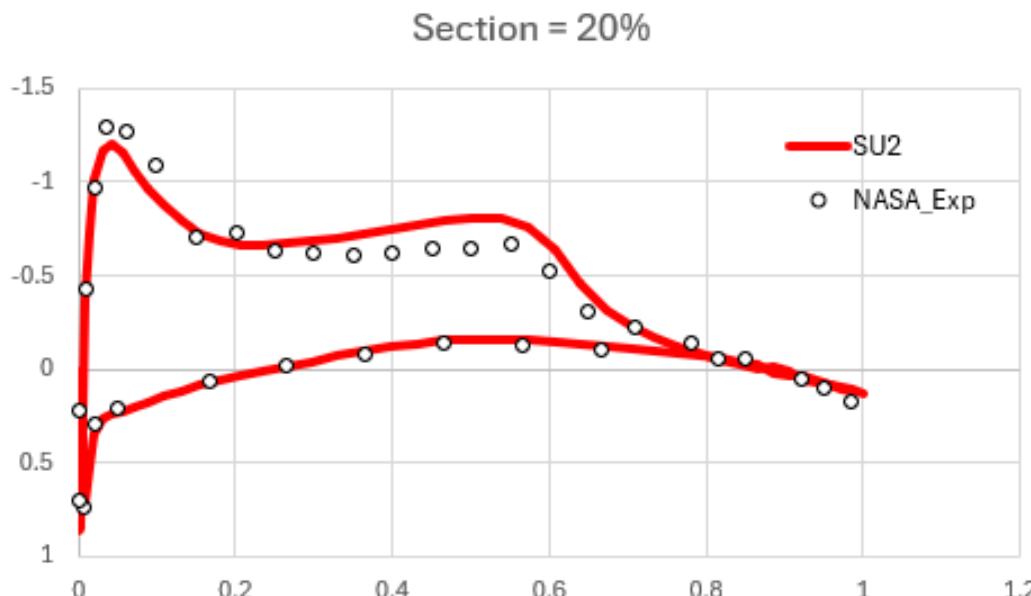
$Y/b = 0.2$ (Section 1)

- C_p



$Y/b = 0.2$ (Section 1)

- Cp_compare

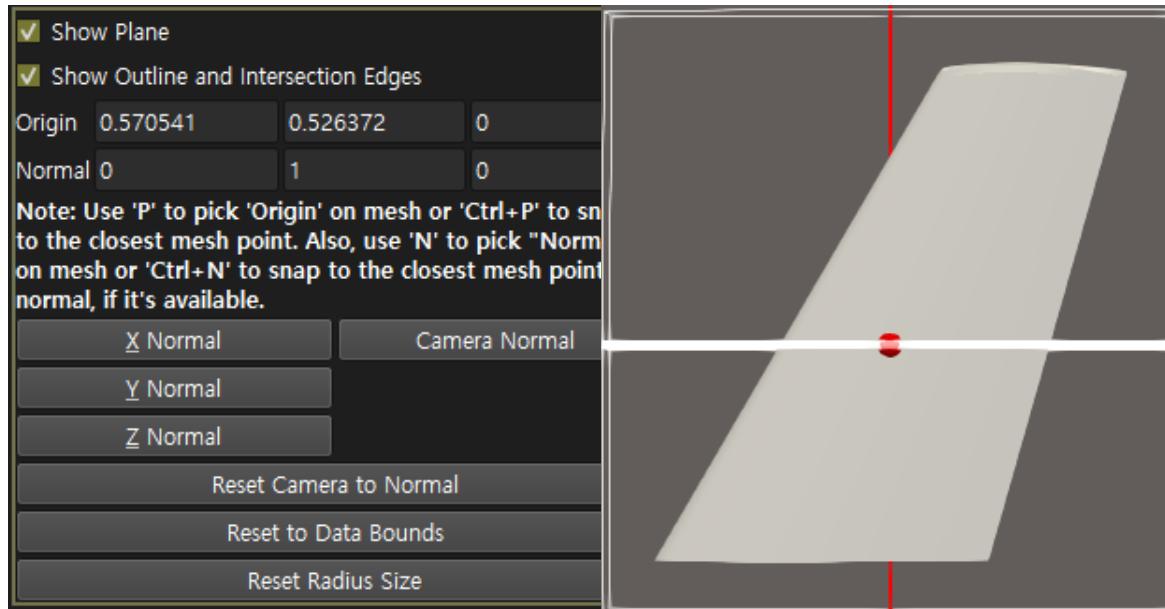


- 0.2~0.7 구간 SU2에서 수치해석한 값이 NASA에서 실험 결과 값보다 크게 나온 것을 확인할 수 있다. 즉, SU2가 압력이 약간 더 크다는 것을 알 수 있다.
- 0.2~0.7 구간을 제외한 부분은 수치해석 값과 실험 결과 값이 비슷하게 나온 것을 확인할 수 있다.

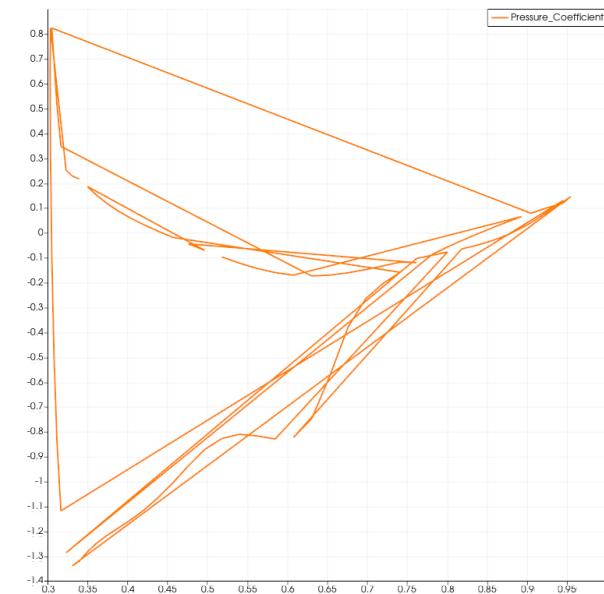
$Y/b = 0.44$ (Section 2)

- Slice

$Y=0.52637200003696$

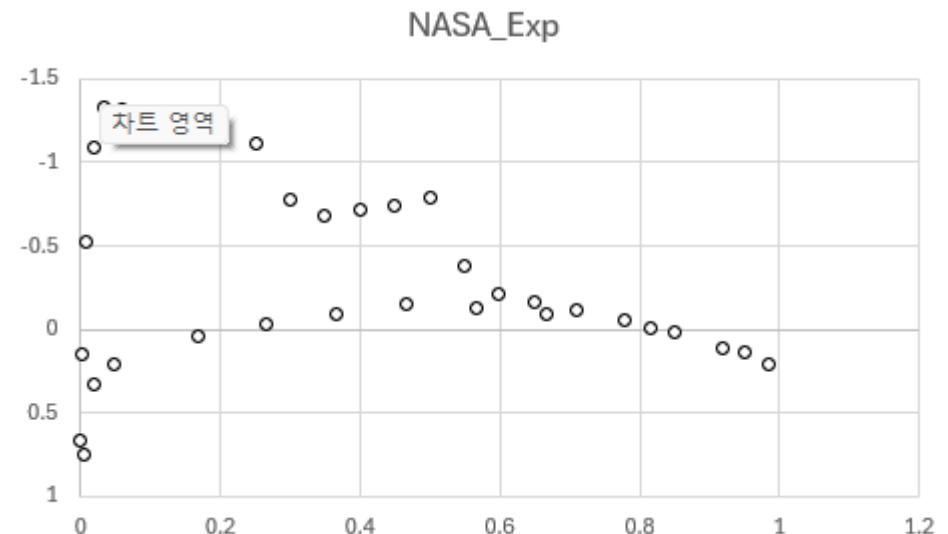
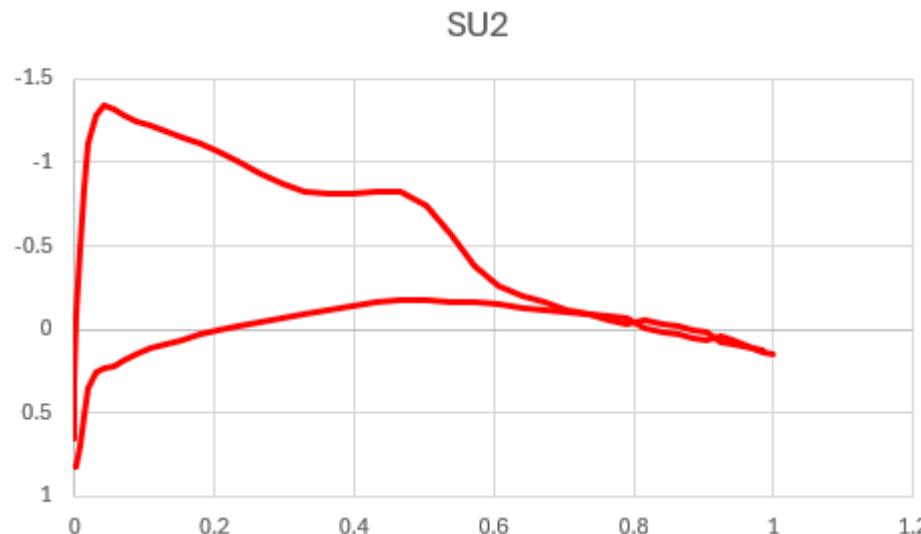


C_p



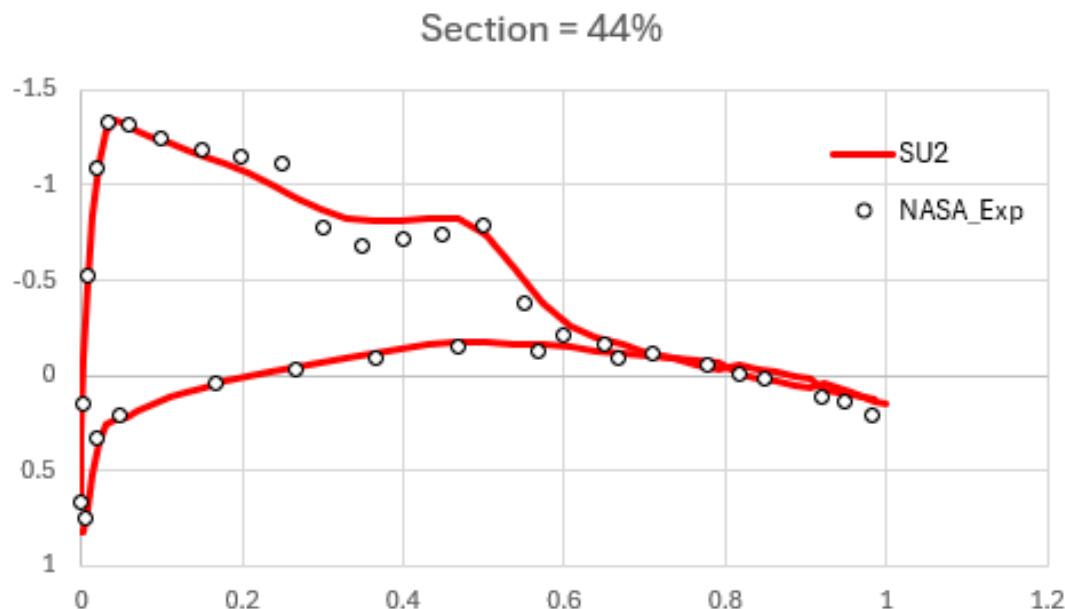
$Y/b = 0.44$ (Section 2)

- C_p



$Y/b = 0.44$ (Section 2)

- Cp_compare

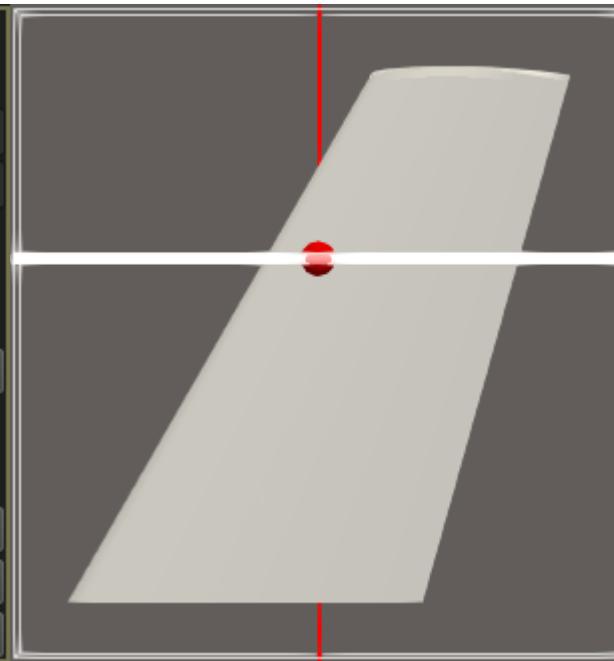
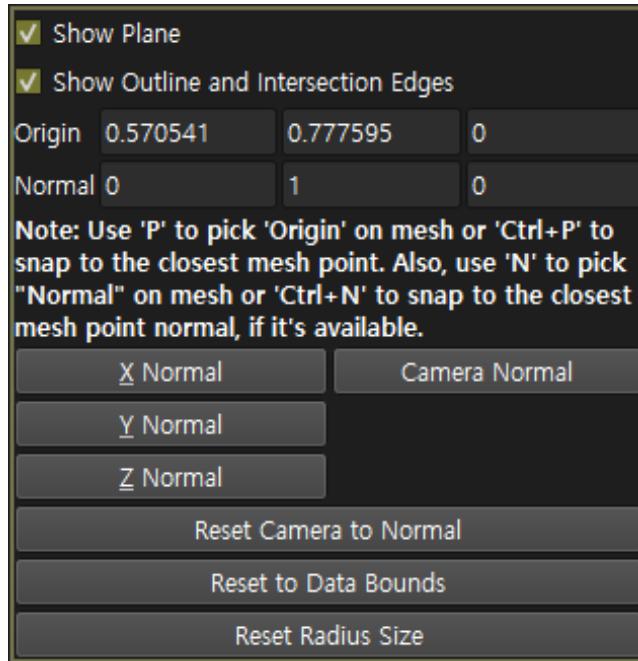


- 모든 범위에서 SU2에서 수치해석한 값과 NASA에서 실험 결과 값이 거의 차이가 없는 것을 볼 수 있다.

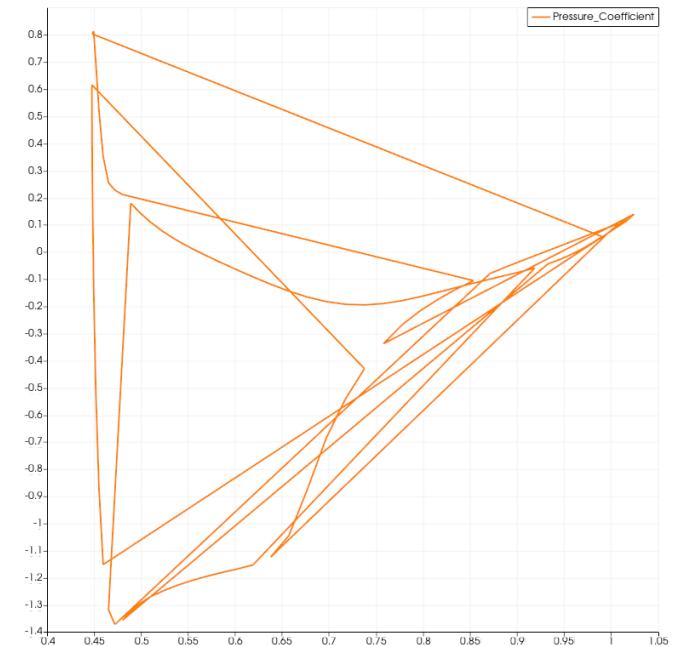
$Y/b = 0.65$ (Section 3)

- Slice

$Y=0.7775950000546$

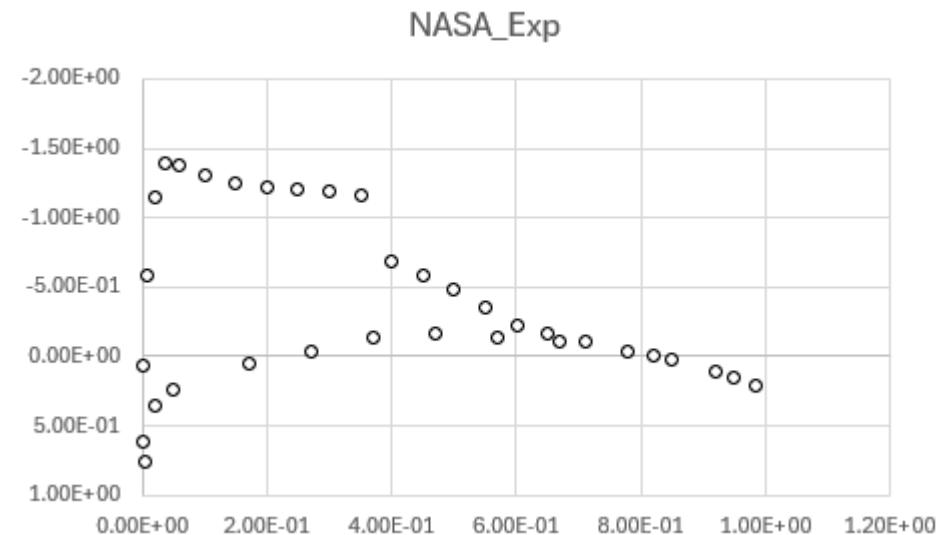
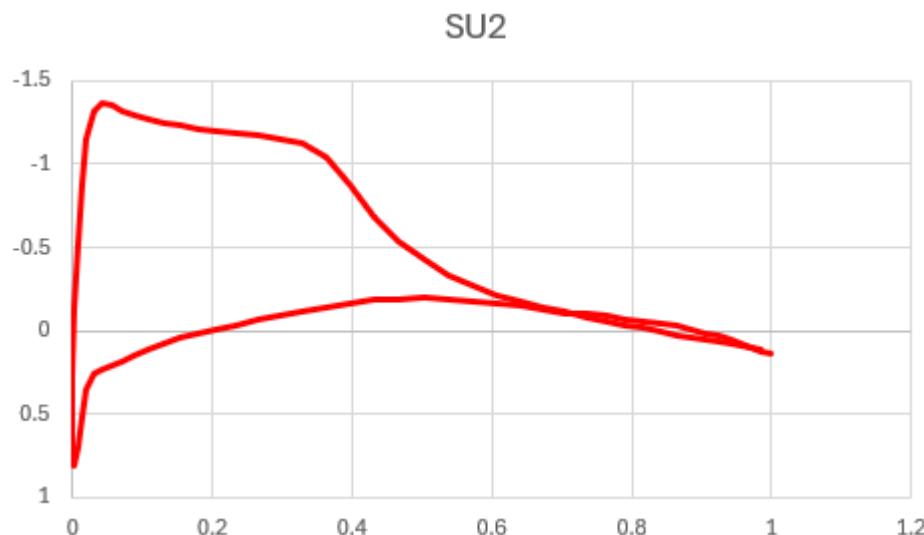


C_p



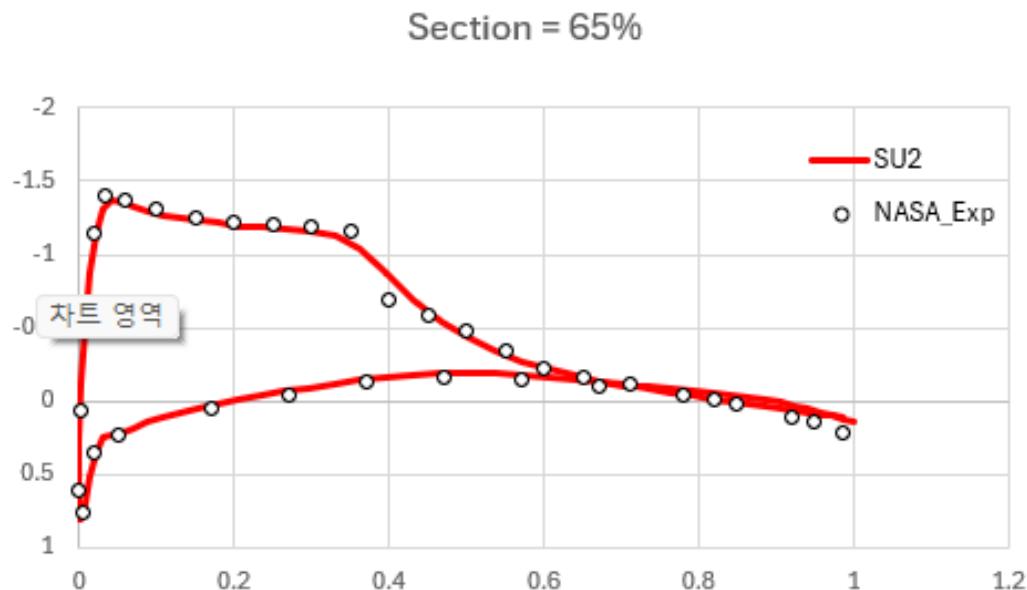
$Y/b = 0.65$ (Section 3)

- C_p



$Y/b = 0.65$ (Section 3)

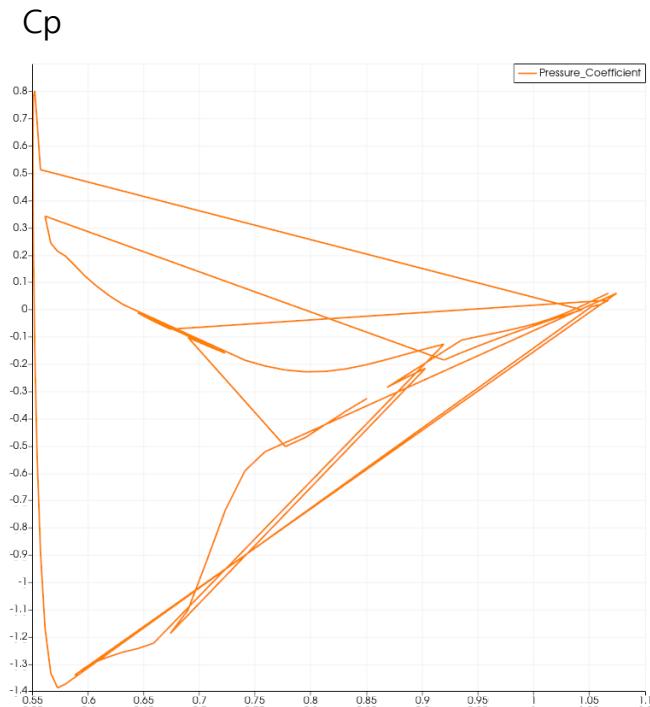
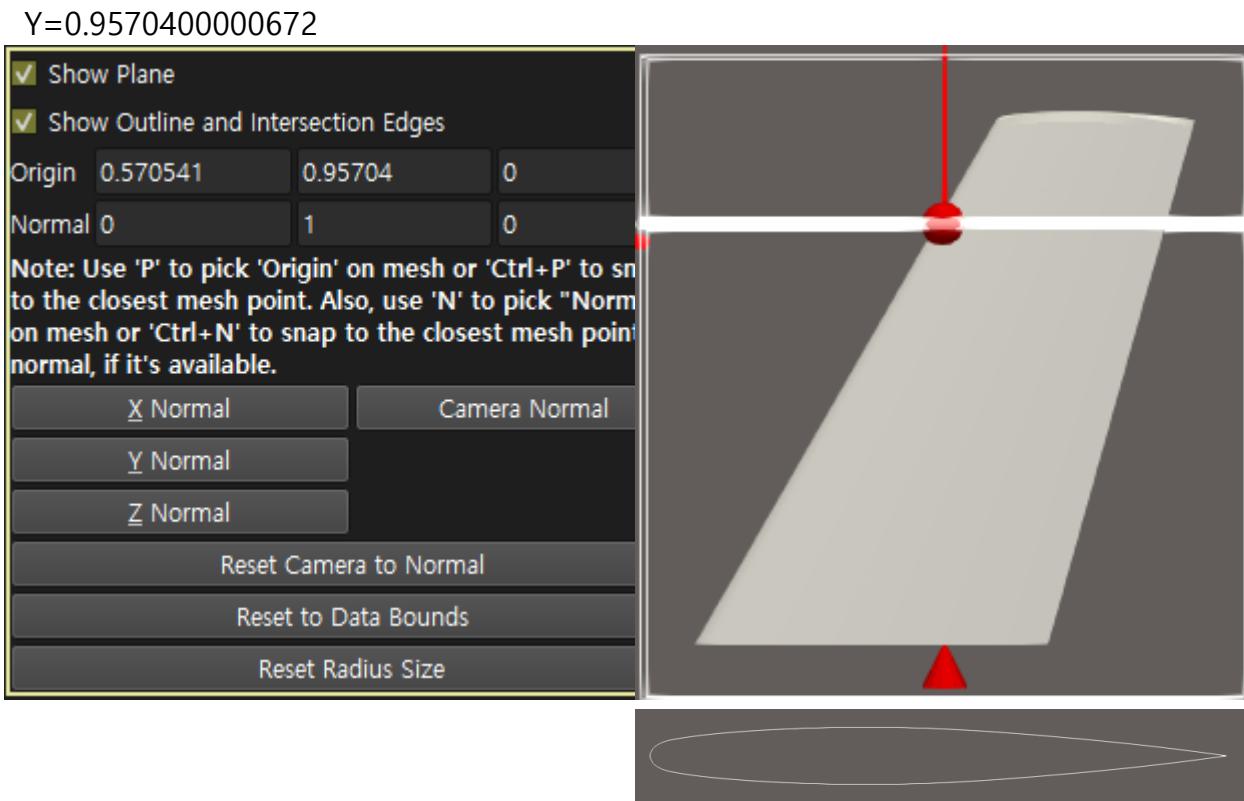
- Cp_compare



- 모든 범위에서 SU2에서 수치해석한 값과 NASA에서 실험 결과 값이 거의 차이가 없는 것을 볼 수 있다.

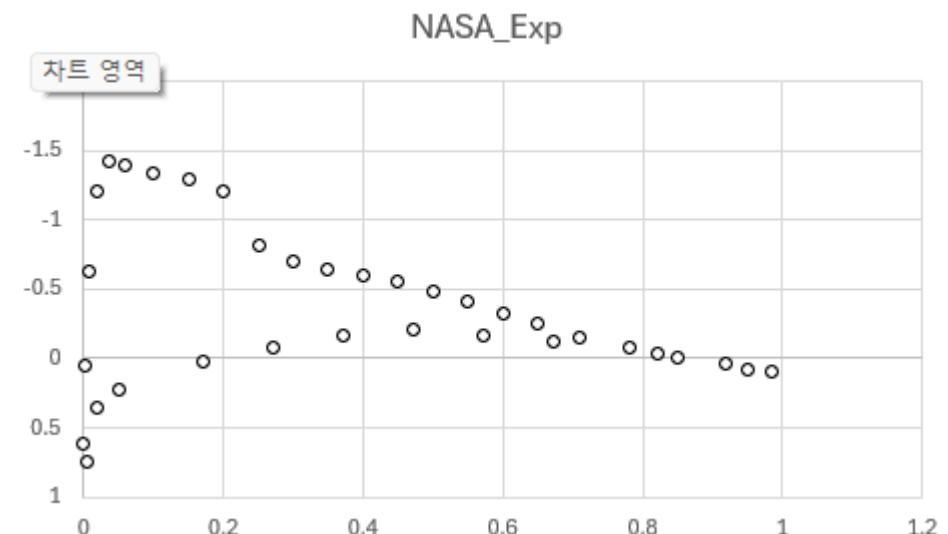
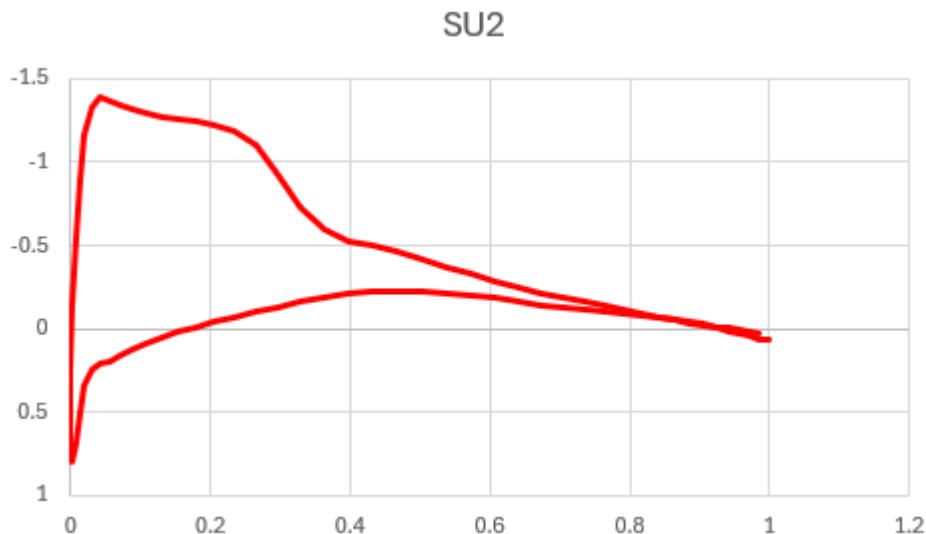
$Y/b = 0.8$ (Section 4)

- Slice



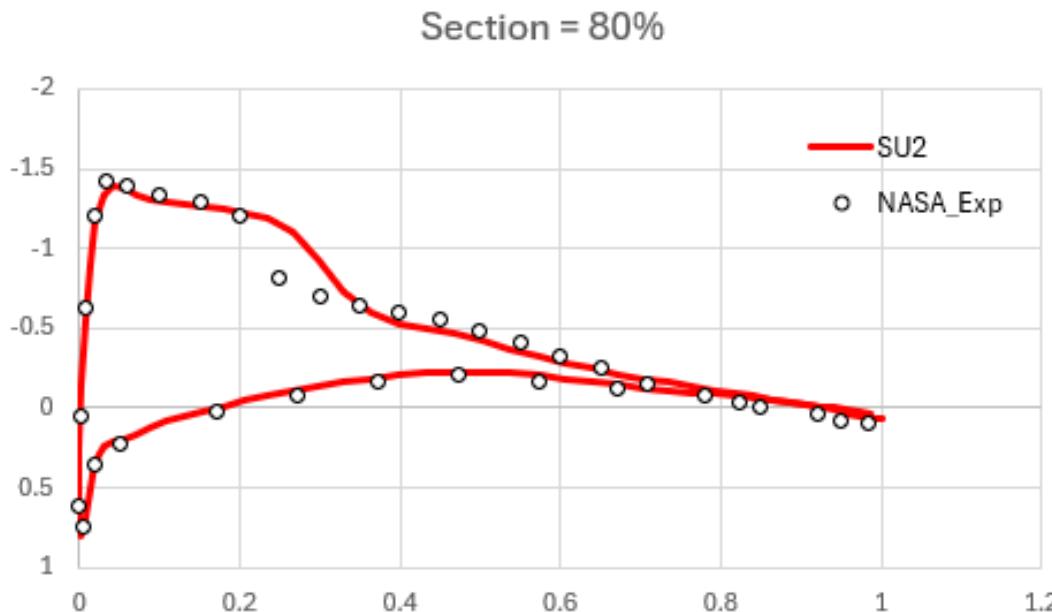
$Y/b = 0.8$ (Section 4)

- C_p



$Y/b = 0.8$ (Section 4)

- Cp_compare

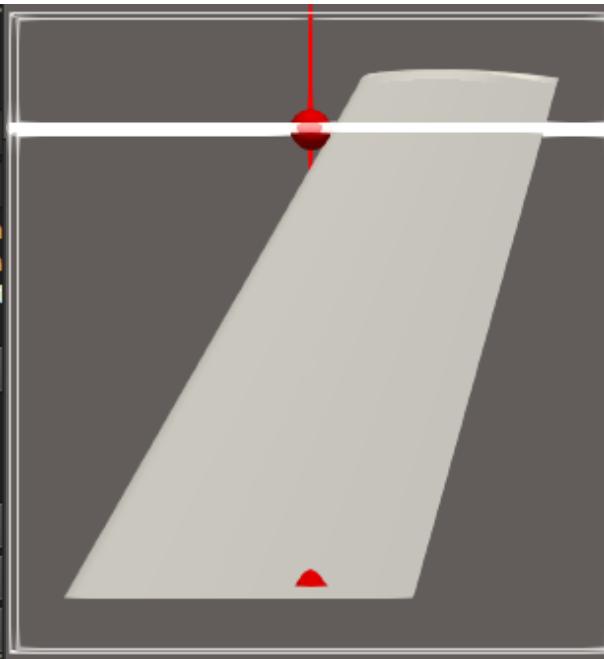
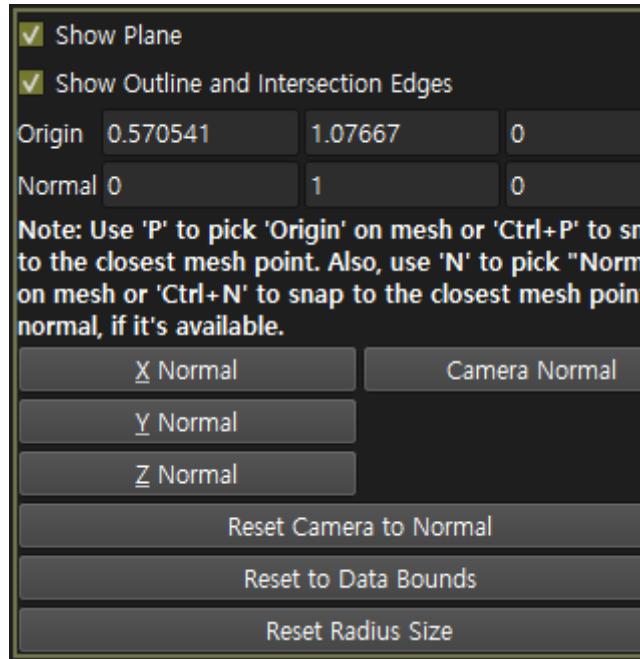


- 0.2~0.4 구간 SU2에서 수치해석한 값이 NASA에서 실험 결과 값보다 크게 나온 것을 확인할 수 있다. 즉, SU2가 압력이 약간 더 크다는 것을 알 수 있다.
- 0.2~0.4 구간을 제외한 부분은 수치해석 값과 실험 결과 값이 비슷하게 나온 것을 확인할 수 있다.

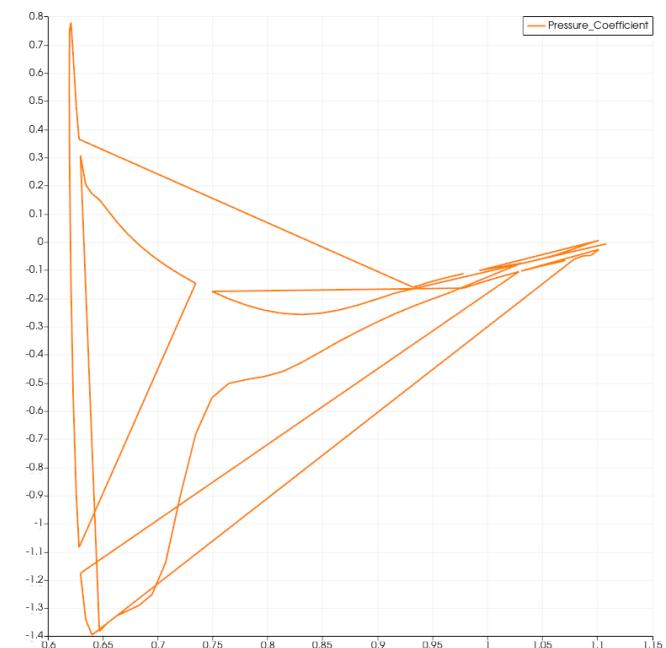
$Y/b = 0.9$ (Section 5)

- Slice

$Y=1.0766700000756$

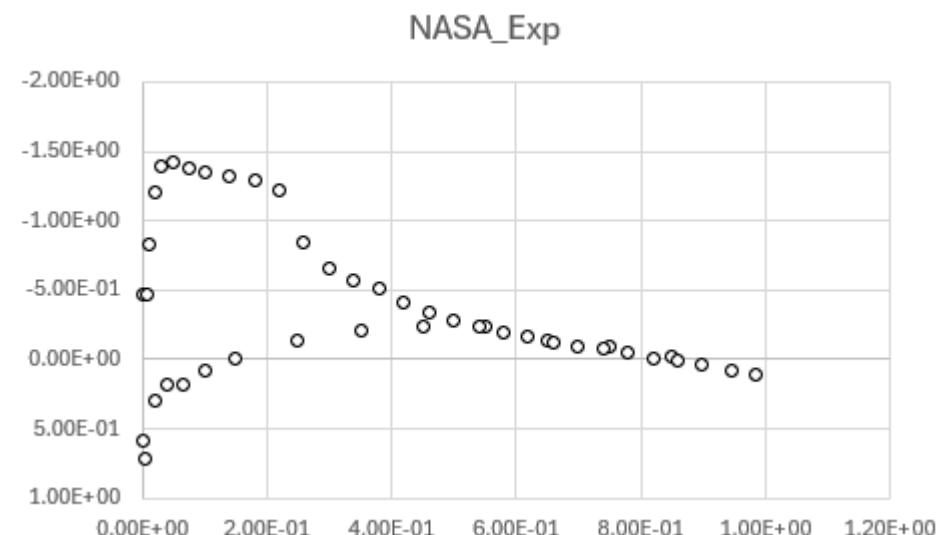
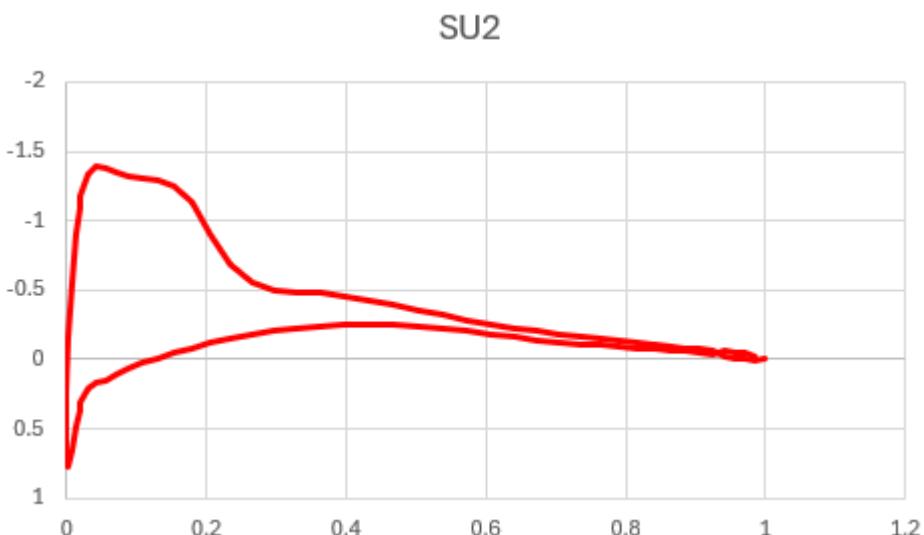


C_p



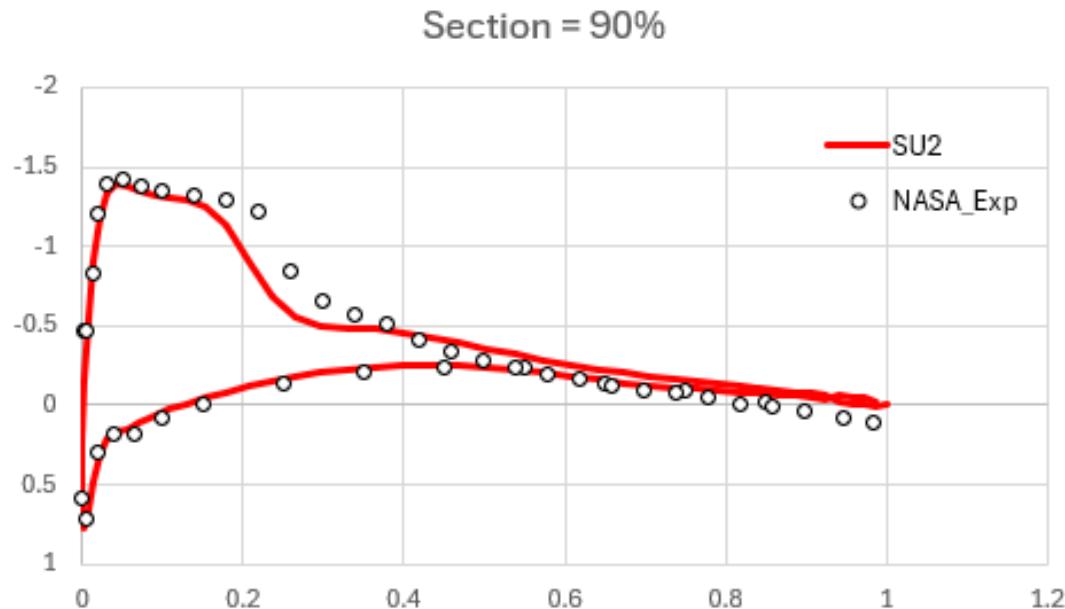
$Y/b = 0.9$ (Section 5)

- C_p



$Y/b = 0.9$ (Section 5)

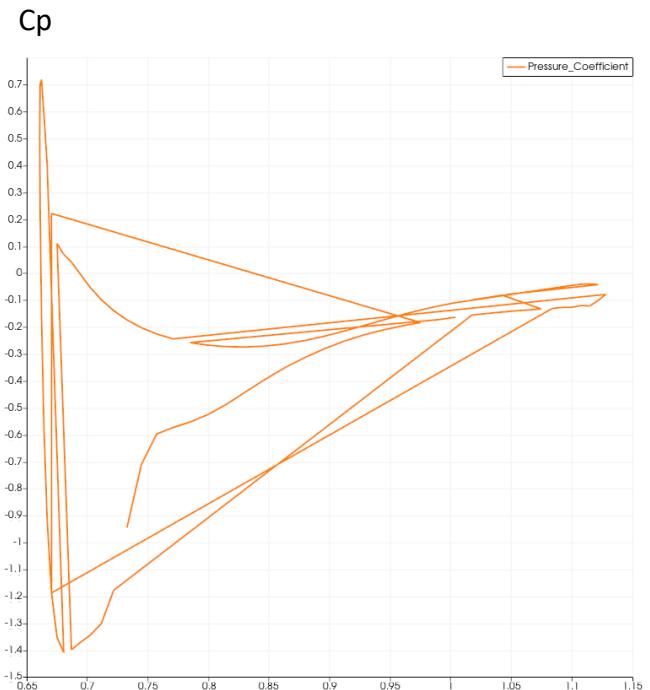
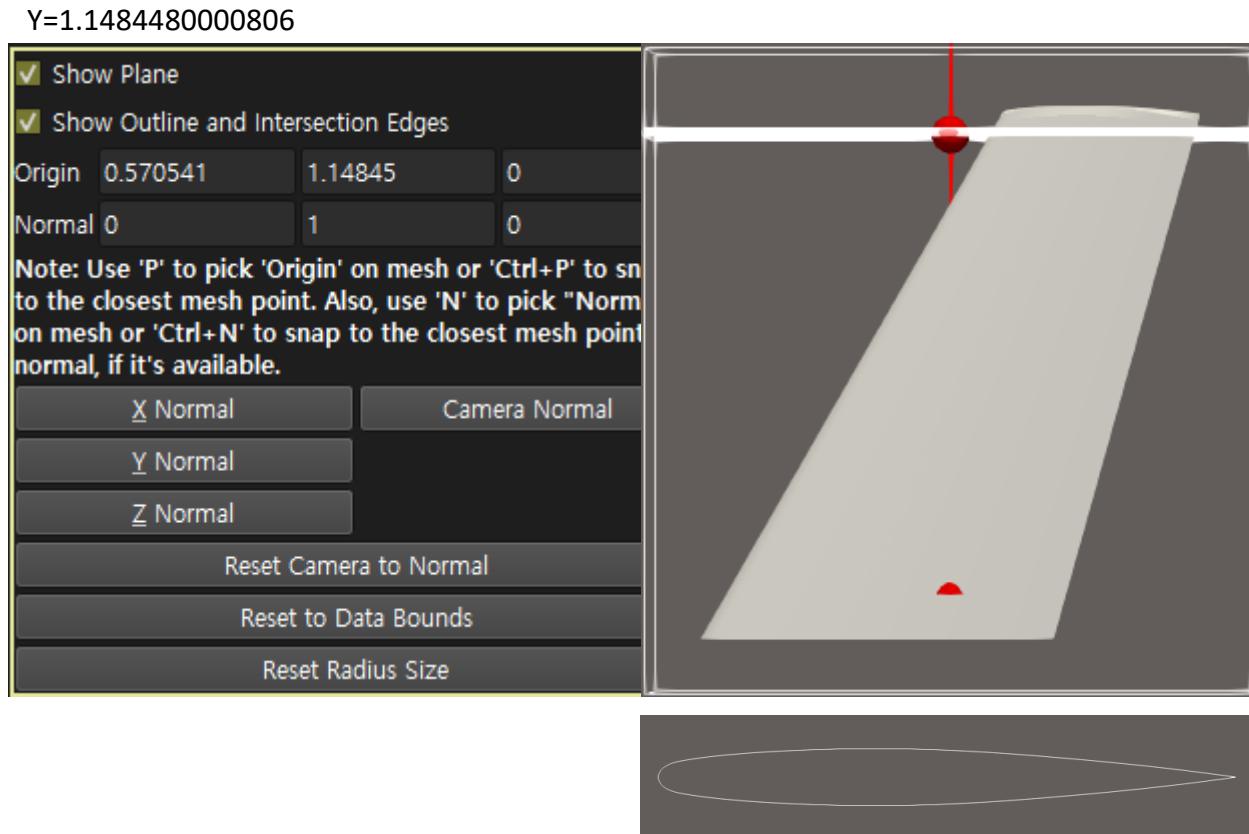
- Cp_compare



- 0.15~0.4 구간 SU2에서 수치해석한 값이 NASA에서 실험 결과 값보다 작게 나온 것을 확인할 수 있다. 즉, NASA가 압력이 약간 더 크다는 것을 알 수 있다.
- 반대로 0.4~1 구간은 SU2 값이 NASA 값보다 크게 나온 것을 확인할 수 있다. 즉, SU2가 압력이 약간 더 크다는 것을 알 수 있다.

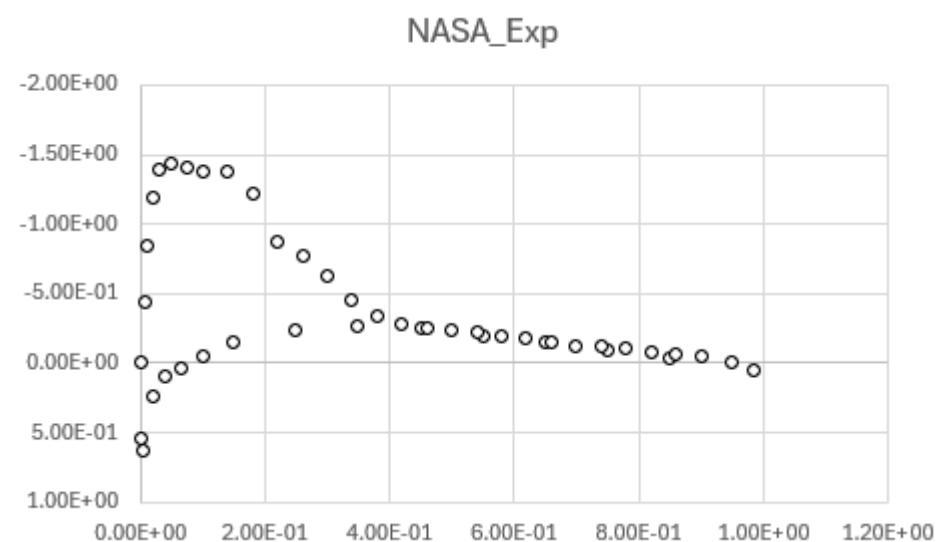
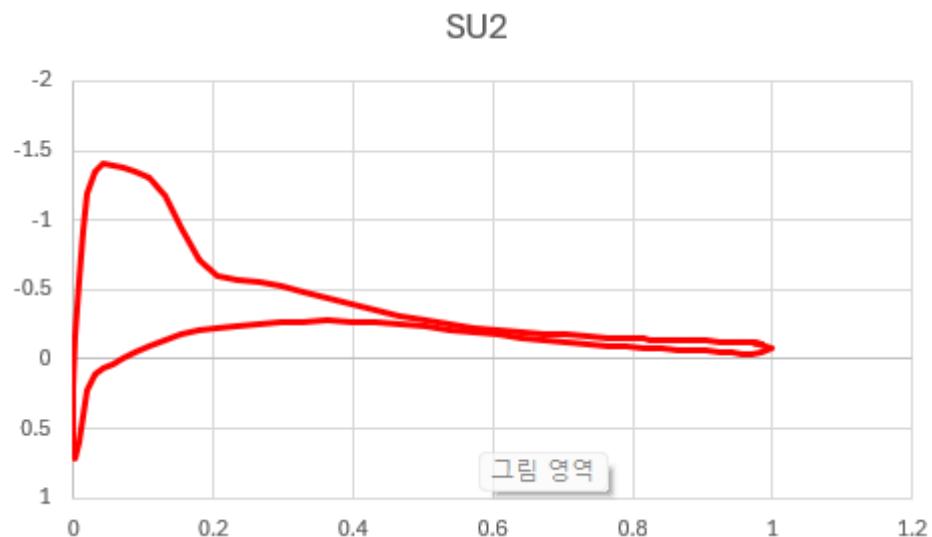
$Y/b = 0.96$ (Section 6)

- Slice



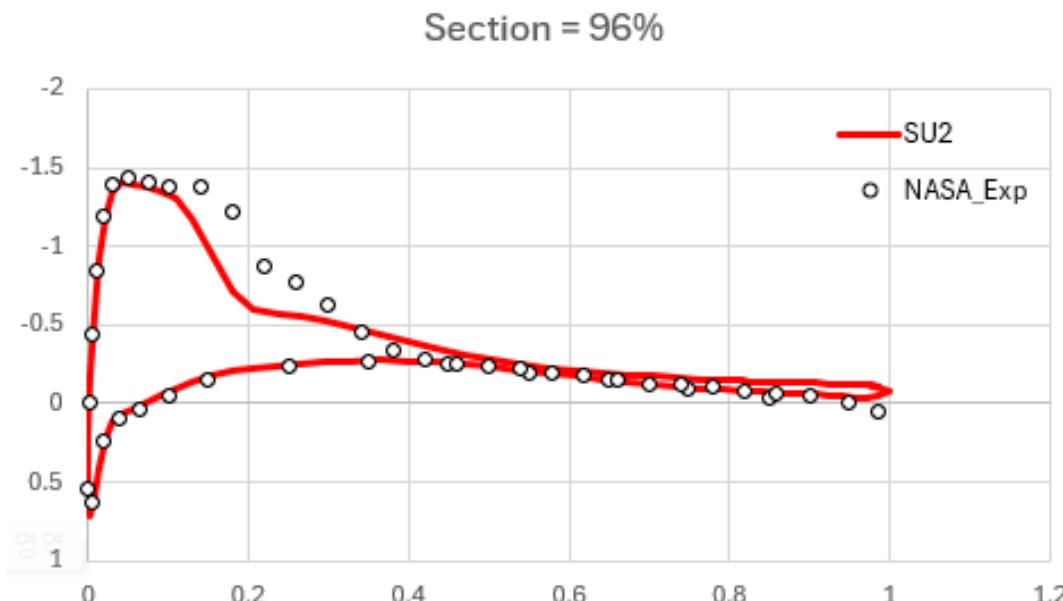
$Y/b = 0.96$ (Section 6)

- C_p



$Y/b = 0.96$ (Section 6)

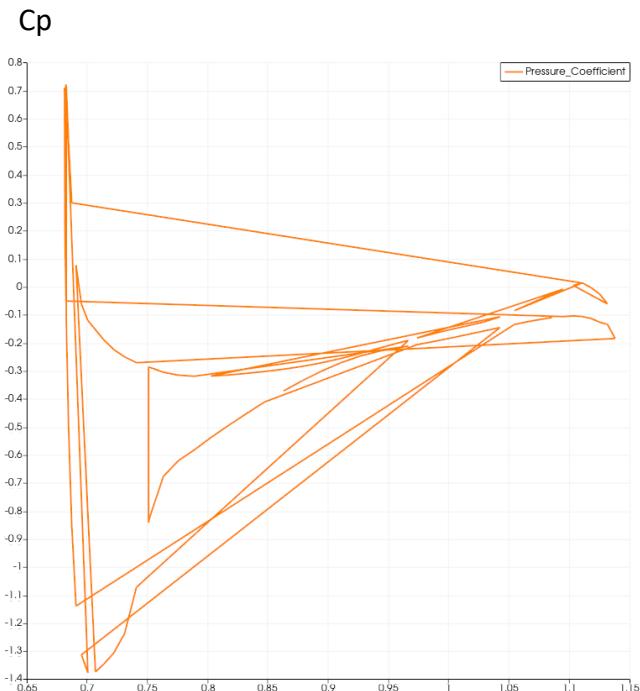
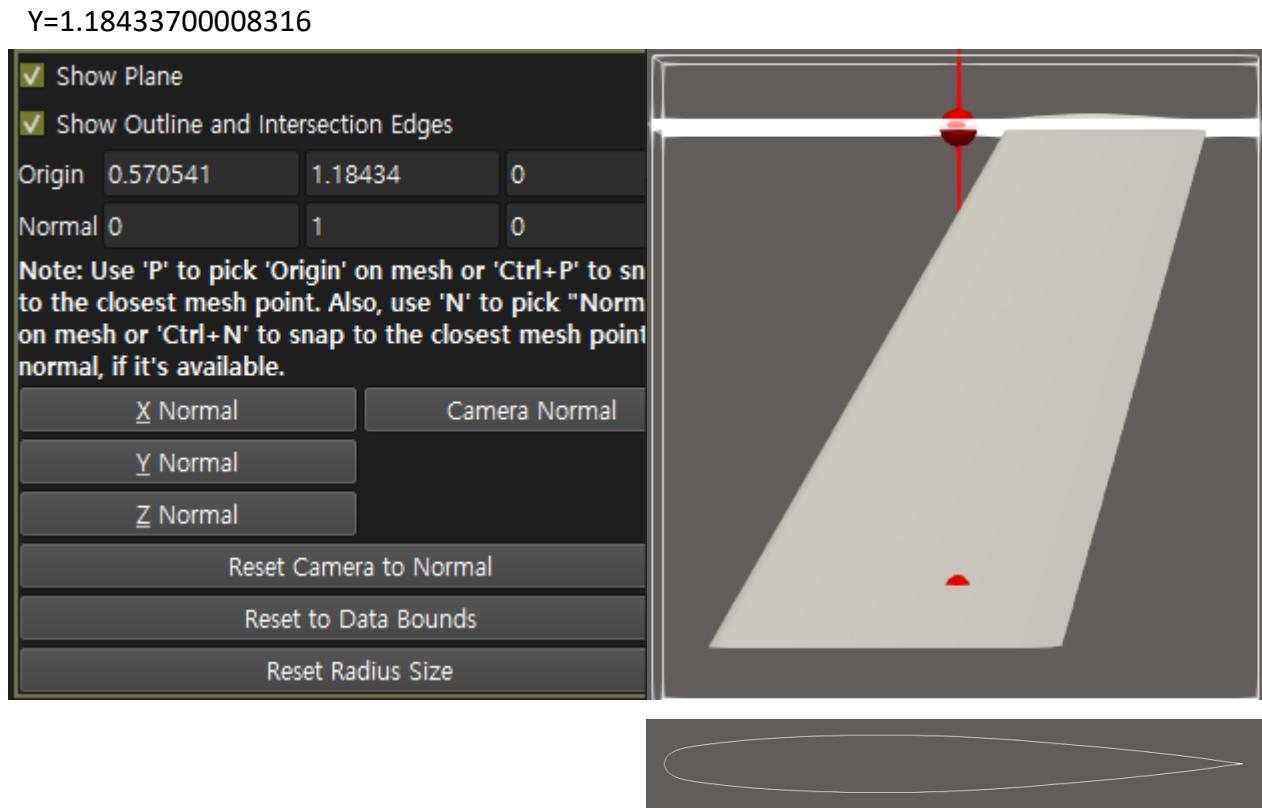
- Cp_compare



- 0.1~0.4 구간 SU2에서 수치해석한 값이 NASA에서 실험 결과 값보다 작게 나온 것을 확인할 수 있다. 즉, NASA가 압력이 약간 더 크다는 것을 알 수 있다.
- 0.1~0.4 구간을 제외한 부분은 수치해석 값과 실험 결과 값이 비슷하게 나온 것을 확인할 수 있다.

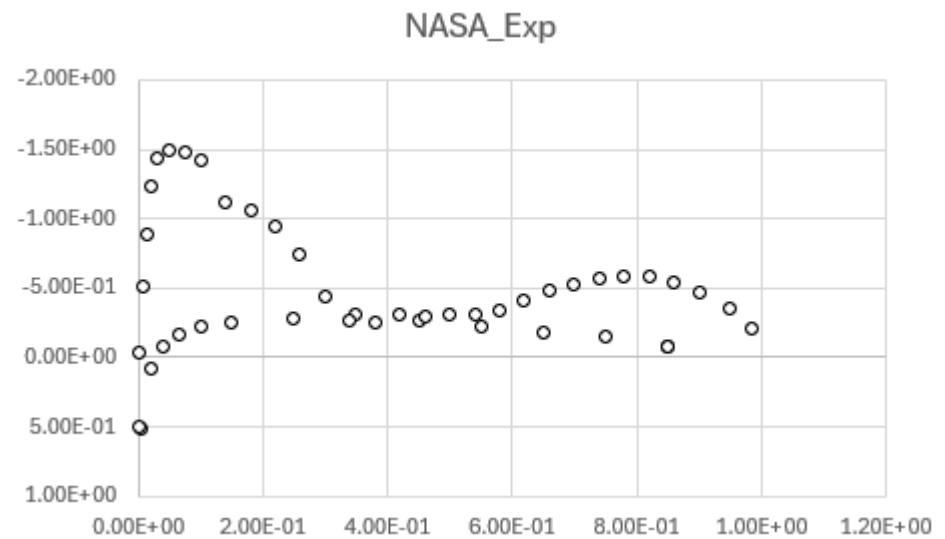
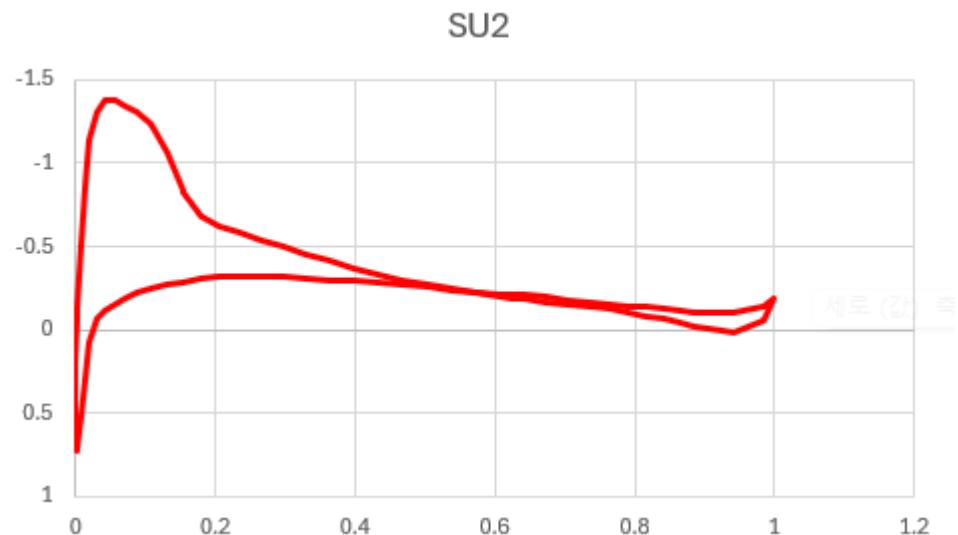
$Y/b = 0.99$ (Section 7)

- Slice



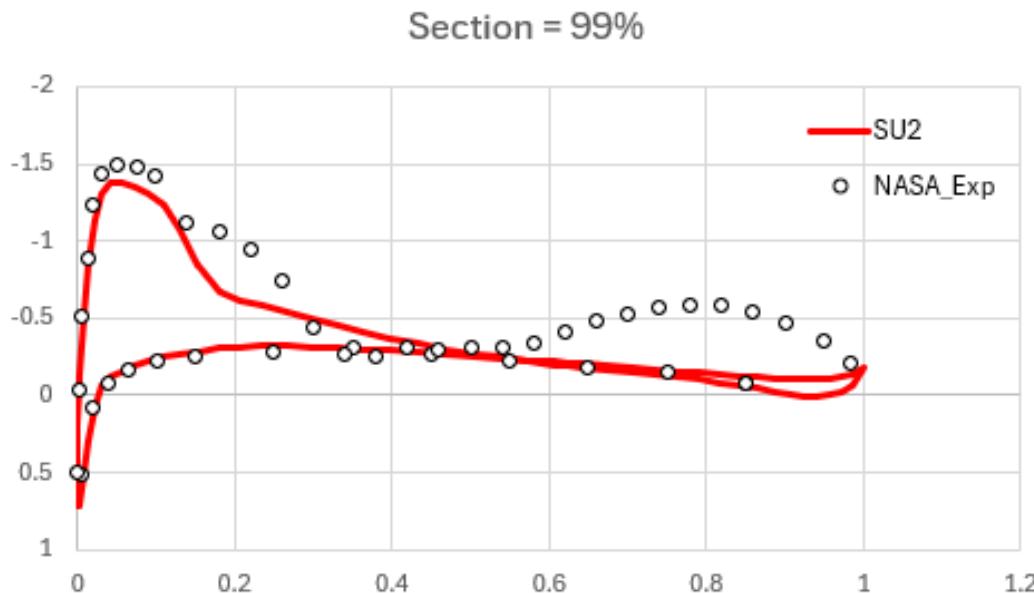
$\gamma/b = 0.99$ (Section 7)

- C_p



$Y/b = 0.99$ (Section 7)

- Cp_compare



- 0.1~1 구간 SU2에서 수치해석한 값이 NASA에서 실험 결과 값보다 작게 나온 것을 확인할 수 있다. 즉, NASA 가 압력이 더 크다는 것을 알 수 있다.
- 특히 0.5~1 구간은 수치해석 값과 실험 결과 값이 차이 가 많이 나오는 것을 확인할 수 있다.