SU2 10주차 보고서

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Simulation Condition

- **Langley Research Center 홈페이지에는 3D ONERA M6 Wing 의 해석을 위한 해석 조건과 결과값이 공개됨.**

Test cases description:

- Case 2308: M_{inf}=0.84, Re_{c_root}=14.6 x 10^6, AoA=3.06 deg, T_{inf}=540 R.
- Case 2565: M_{inf}=0.84, Re_{c_root}=14.6 x 10^6, AoA=6.06 deg, T_{inf}=540 R.
- For the purposes of the CFD V&V exercise performed here (for comparisons between codes), only the wing with the SHARP trailing edge should be used. The Reynolds number of the original experiment (based on the blunt mean aerodynamic chord of 646.07 mm of the model), was Re_{MAC}=11.72 x 10^6 for Case 2308 and Re_{MAC}=11.71 x 10^6 for Case 2565. However, for the purposes of this CFD exercise, Re_{c_root}=14.6 x 10^6 (based on root chord with sharp trailing edge) should be used for both cases. This value approximately corresponds with the original experiment.
- Note that Cp data are available for 7 span stations: eta = y/b = 0.2, 0.44, 0.65, 0.8, 0.9, 0.96, and 0.99. The original reference (and some other websites) list the 6th station to be at eta = y/b = 0.95, but recent measurements on the ONERA model have confirmed that it should be 0.96 instead.

- Reference area = 1.15315084119231
- Reference mean aerodynamic chord = 0.801672958512342
- Reference semispan = 1.47601797621980
- The x,y,z moment centers are all taken to be 0.0

Experimental Cp data:

- Case_2308.dat
- Case_2565.dat

```
TITLE = "M6 WING - SURFACE PRESSURE DISTRIBUTIONS"
VARIABLES = "Section", "Tap", "X/L", "Z/L", "CP"
ZONE T="",Run= 565, Mach= 0.8372, Alpha=  6.06, Re= 11.71x10**6, Section 1", I=  34, F=POINT
```

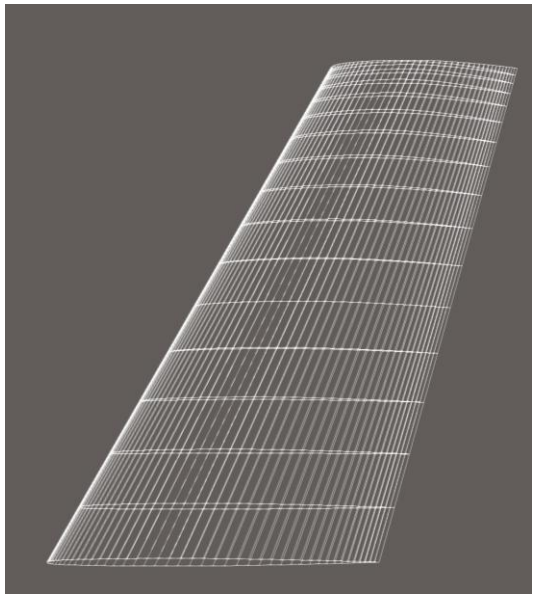
ref: https://turbmodels.larc.nasa.gov/onerawingnumerics_val.html

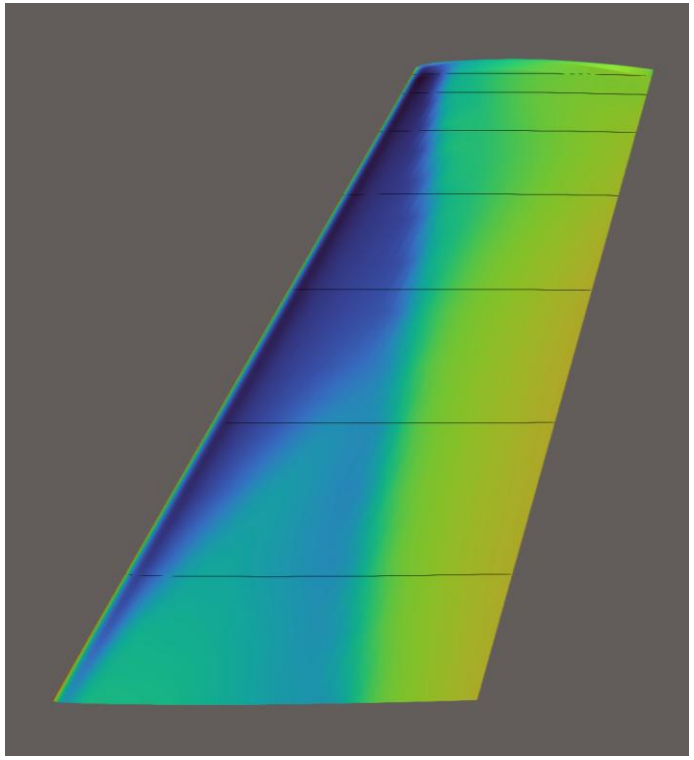
Langley Research Center

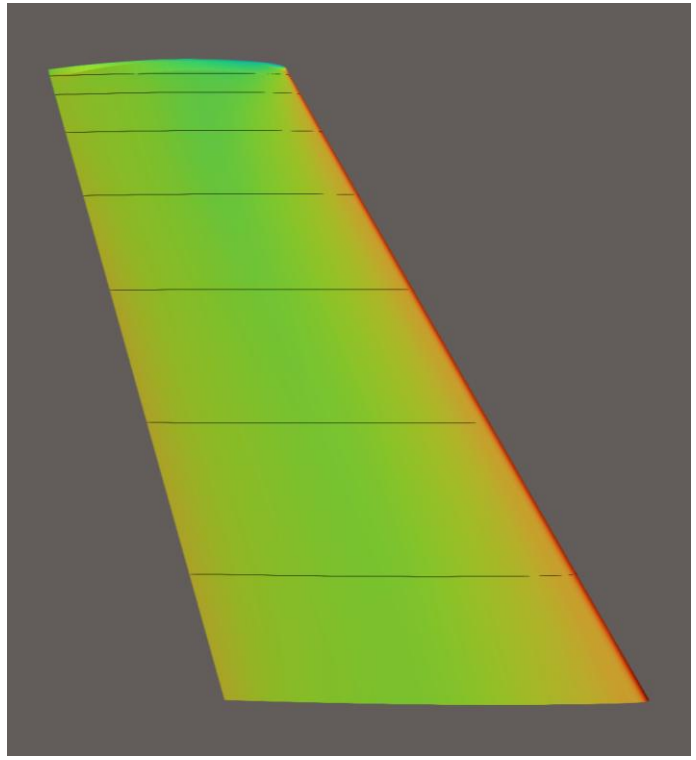
Turbulence Modeling Resource

Mesh & Contour

- Wing span의 20%, 44%, 65%, 80%, 90%, 96%, 99% Section에 슬라이스를 함.
- 각 슬라이스에서 plot data를 하여 wing의 각 section 별 pressure coefficient data를 취합.
- Langley Research Center 에서는 semispan 을 1196.30000008 이라고 공개. semispan에 위의 section 값을 곱하여 slice할 위치 선정.

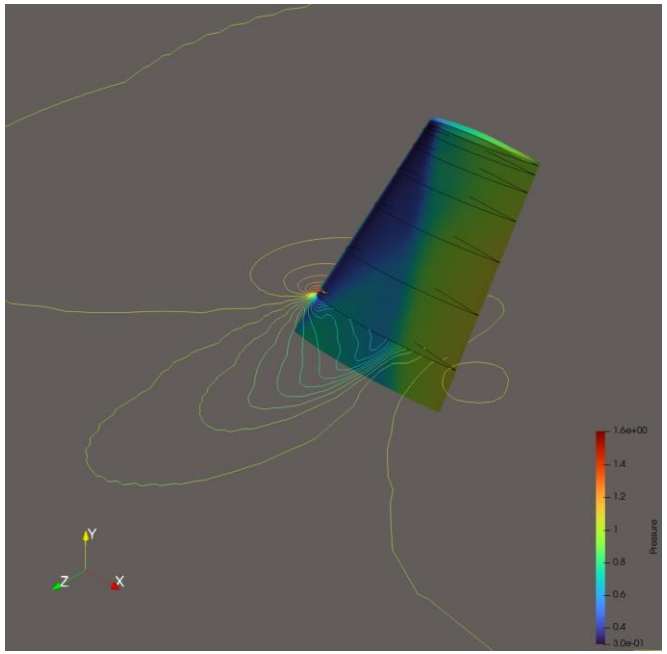


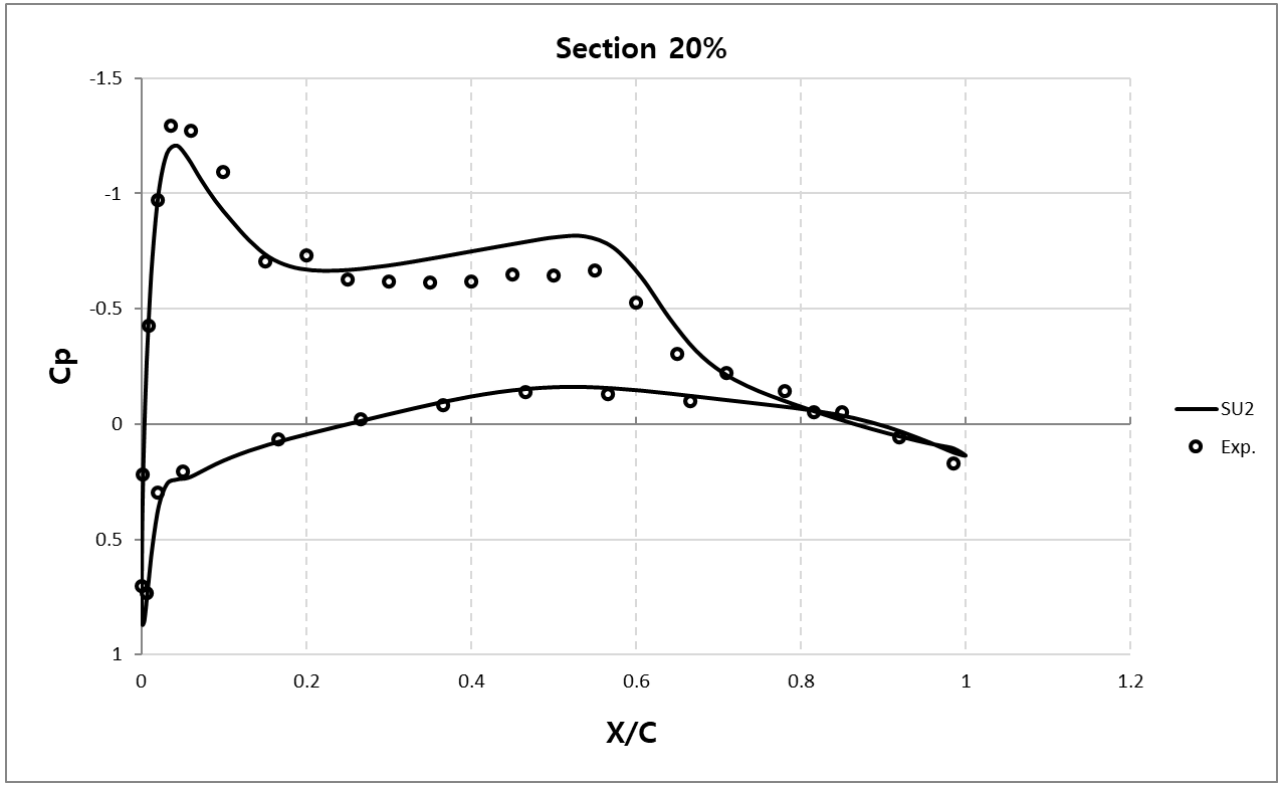




Result

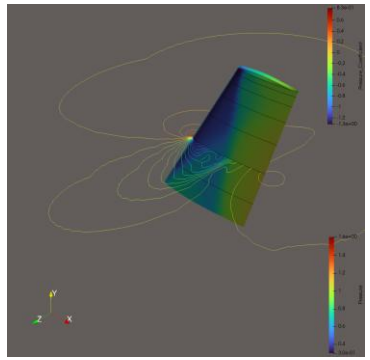
- Chord 의 60% 부근까지는 해석값과 실험값의 차이가 발견.
- Chord 의 0~10%, 50~60% 영역에서 비교적 큰 pressure coefficient
- Chord 의 60%이후로 pressure coefficient 가 급감함.
- Chord 의 80% 이후 즉, 뒷전 부근에서는 날개 양쪽면의 pressure coefficient 값이 거의 유사.

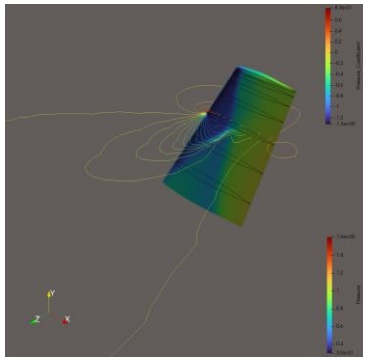


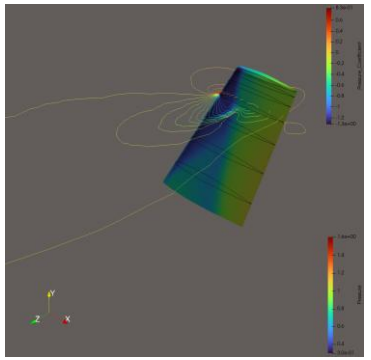


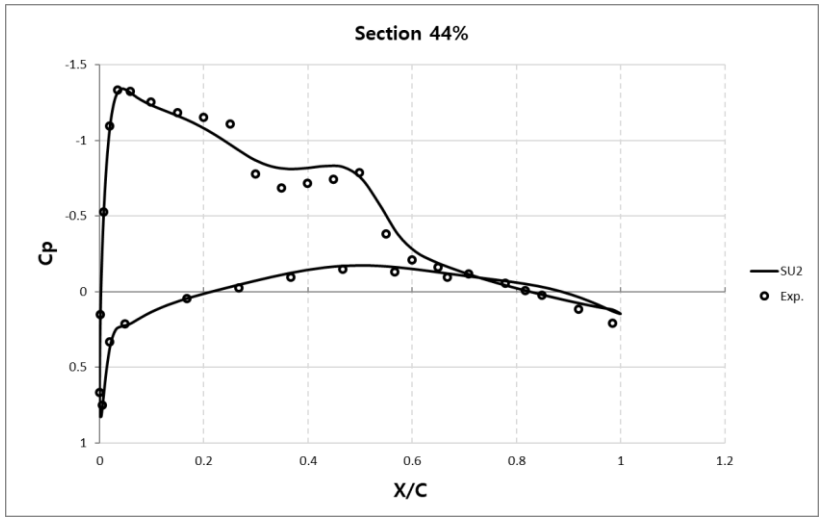
Result

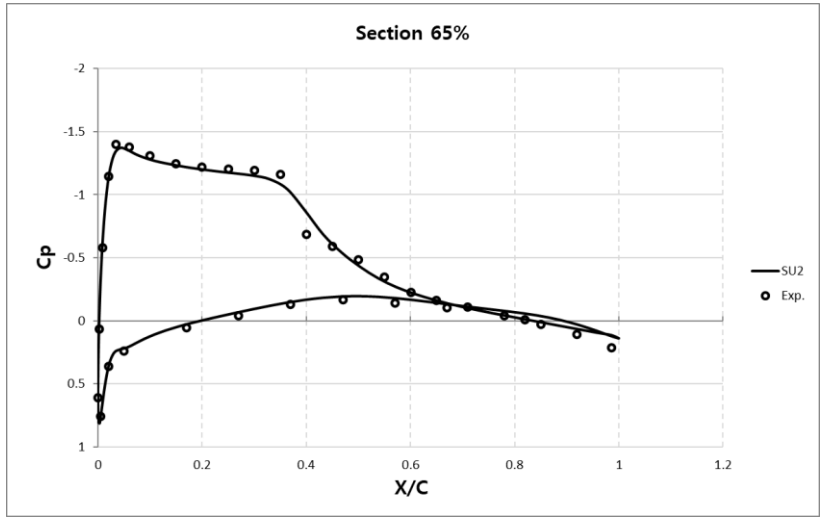
- Pressure coefficient 값이 급감하는 부분이 section 20% 에 비해 앞전에 가까워짐.
- Section 44부터 순서대로 Chord 의 50%, 35%, 25% 부근에서 pressure coefficient 값이 급감.
- Chord 의 20~40% 부근에서 실험값과 해석값이 차이가 남을 확인.

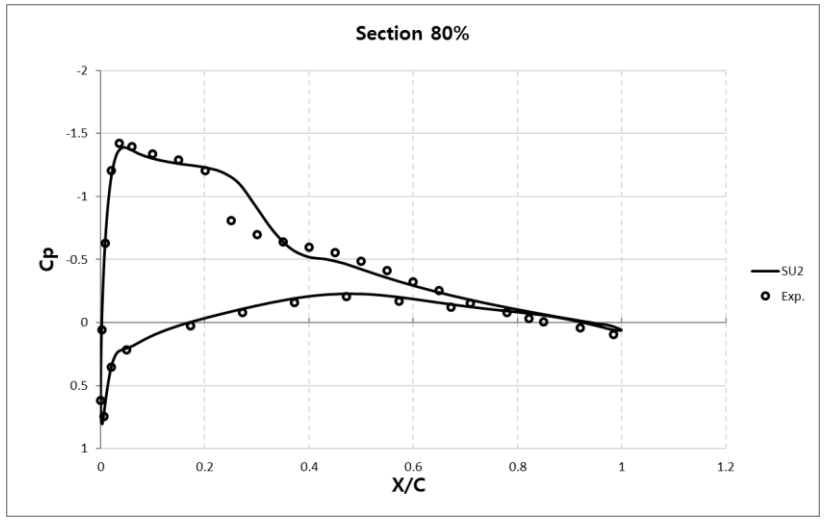












Result

- Section 90%에서는 chord 의 20~40% 부근에서 실험값과 해석값이 차이가 남을 확인.
- Section 96%, 99%에서는 chord 의 10~40% 부근에서 실험값과 해석값이 차이가 남을 확인.
- Section 99%에서는 chord 의 50% 이후에서도 실험값과 해석값이 차이가 남을 확인.