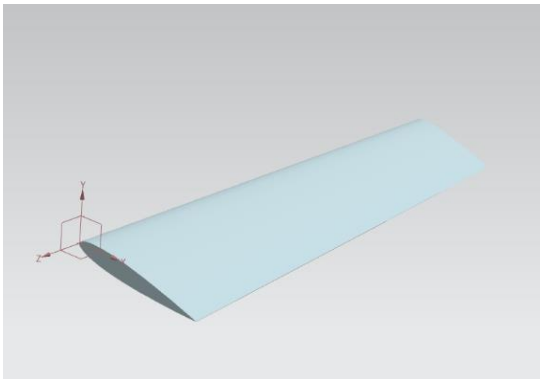
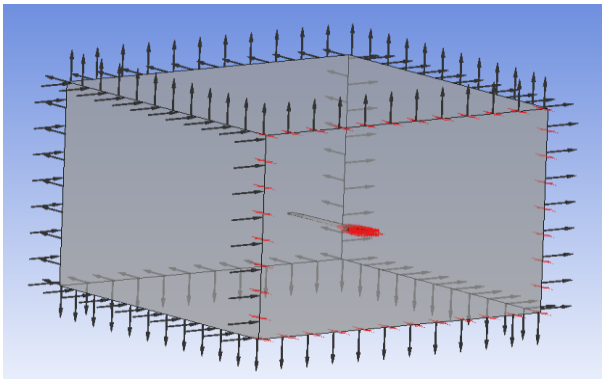
The entire simulation analysis process is as follows:

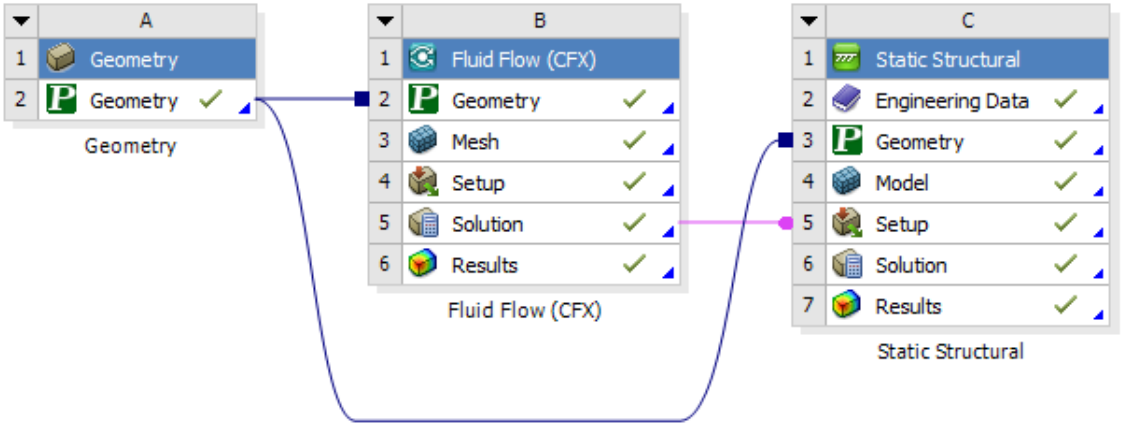
1. Create the wing solid and air domain

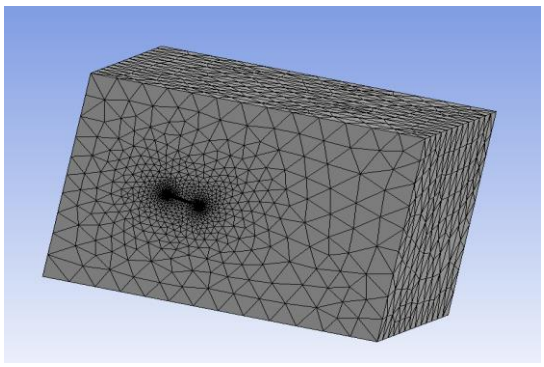


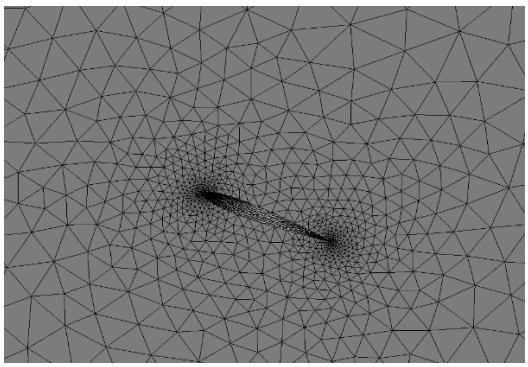


Based on the data in 2D Points of Wing.dat, draw the wing's 2D curves, scale and project them, draw the wing solid, and create the air domain. Use Siemens NX to complete these steps and export the WingBoday.prt and WingBody.x_t files.

2. Setting parameters using Ansys CFX and Static Structural modules

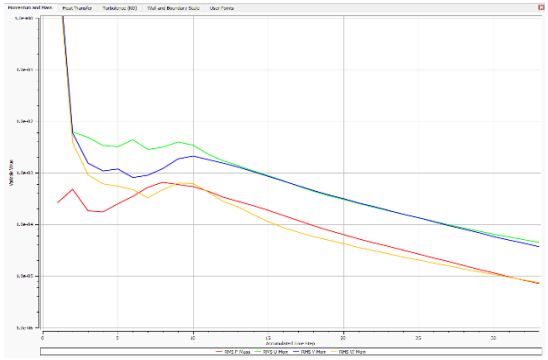


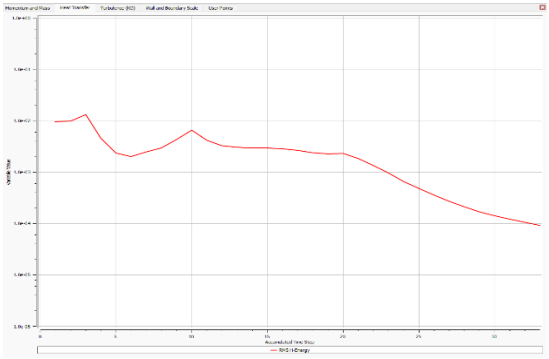


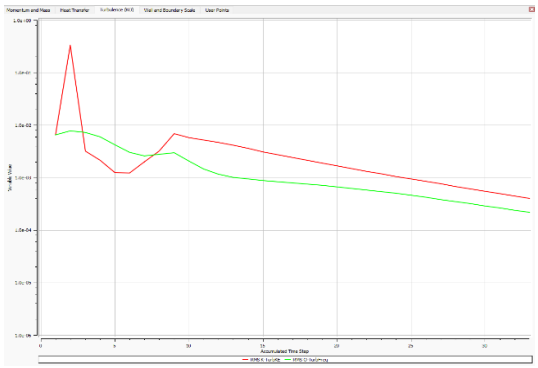


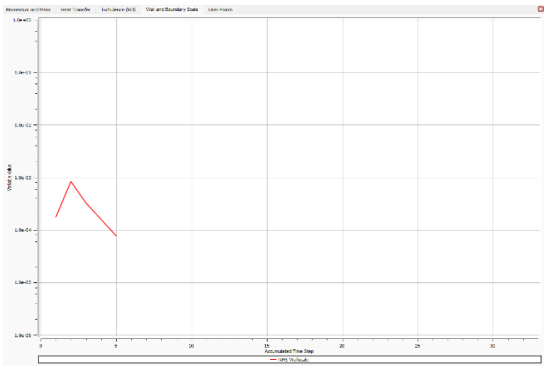
Here, the left side of the air domain is set as the air inlet, and the right side is set as the air outlet. All sides are set as open boundaries except the surface where the wing and air are coupled, which is set as the symmetry surface.

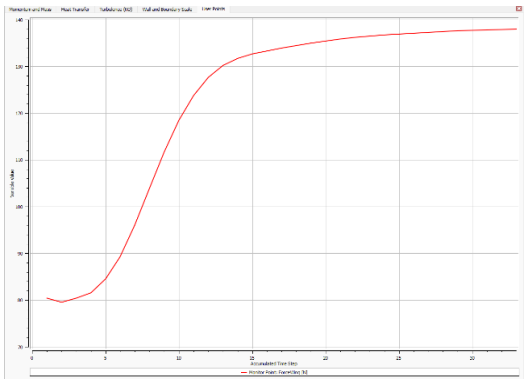
3. After setting up the simulation coupling operation





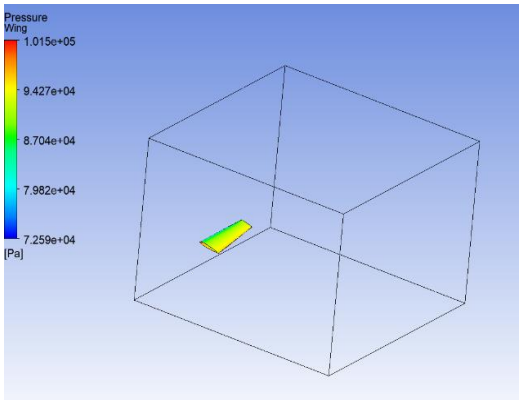


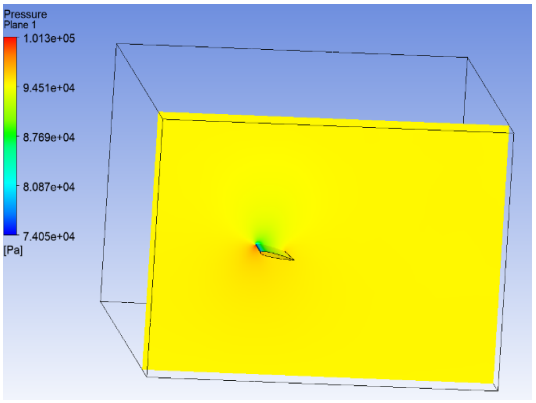


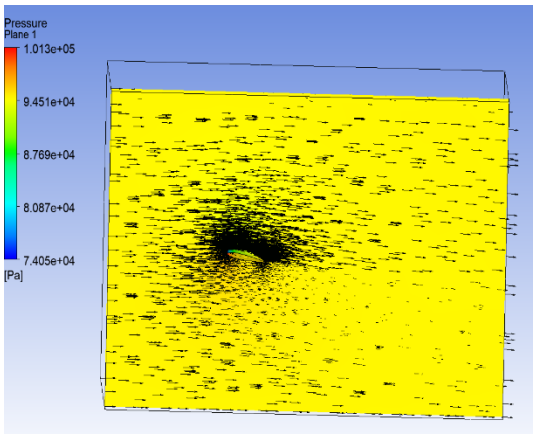


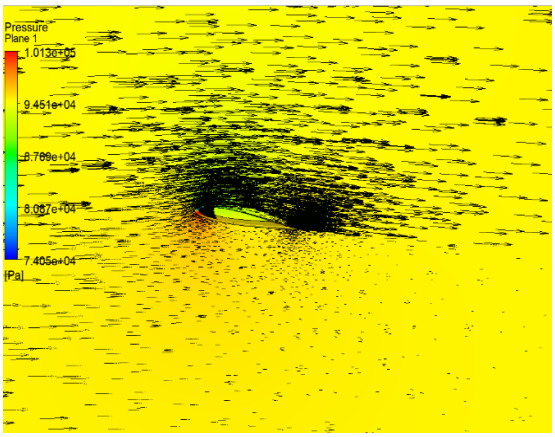
The changing trends of the five parameters in the coupling operation, namely Momentum and Mass, Heat Transfer, Turbulence (KO), Wall and Boundary Scale, and User Points, are shown.

4. Simulation results analysis

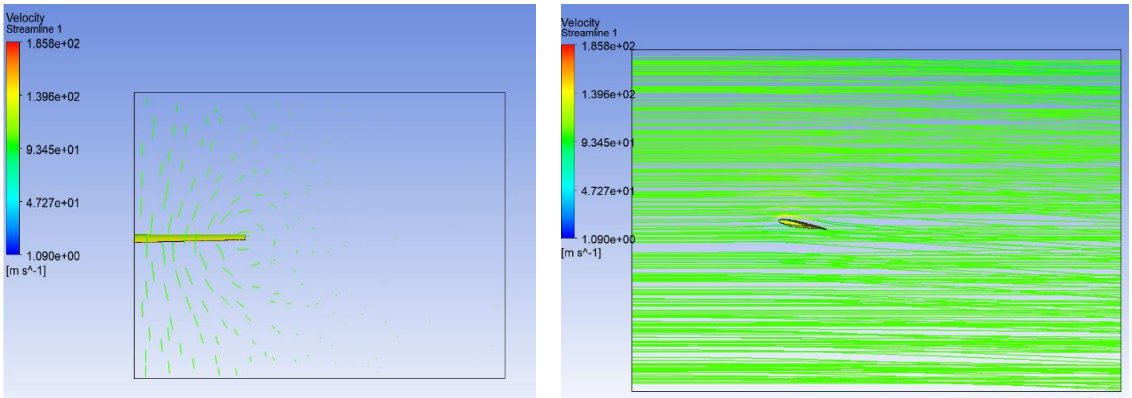




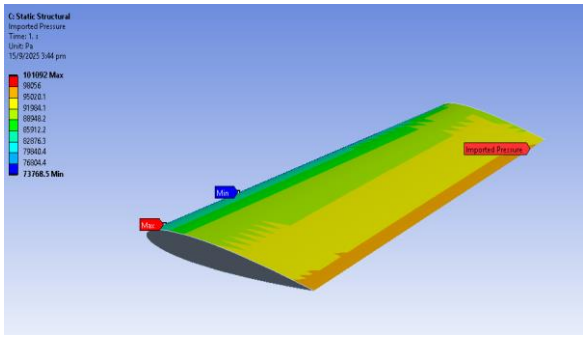


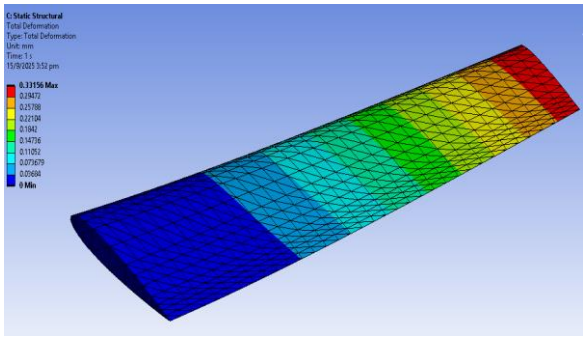


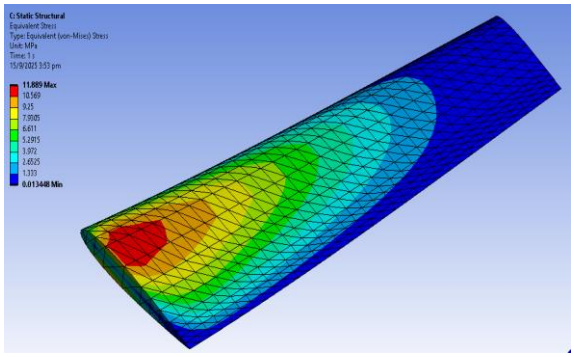
Vectors are used here to show the pressure change trend. We can see that the pressure changes on the wing surface are obvious, and vortices are generated near the wing.

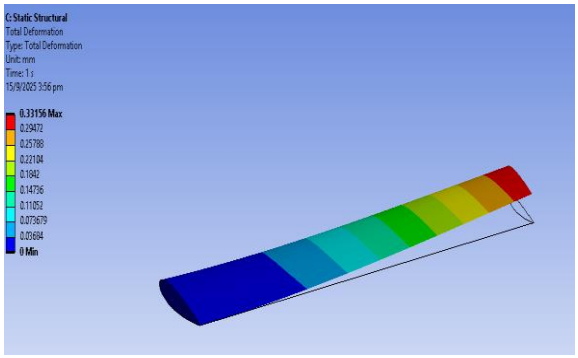


Velocity streamlines from two different directions reveal the flow field disturbances near the wing. I can see that, as mentioned in the relevant literature, the wingtip disturbances are quite pronounced. If we had more detailed wing data and performance requirements, we could conduct more detailed experimental verification and theoretical exploration. Because the flow field near the wing is so clear, we can use extremely fine probes to measure the flow velocity.









The above results account for changes in the fluid's pressure field and velocity. The simulation results here account for changes in stress on the solid wing. We can see that the wing tip experiences significant deformation due to stress. Further research in this area could lead to detailed analysis of the mechanical properties and stress-deformation levels of aircraft wings.