Aerodynamics of a NACA4412 Wing Using CFD Method

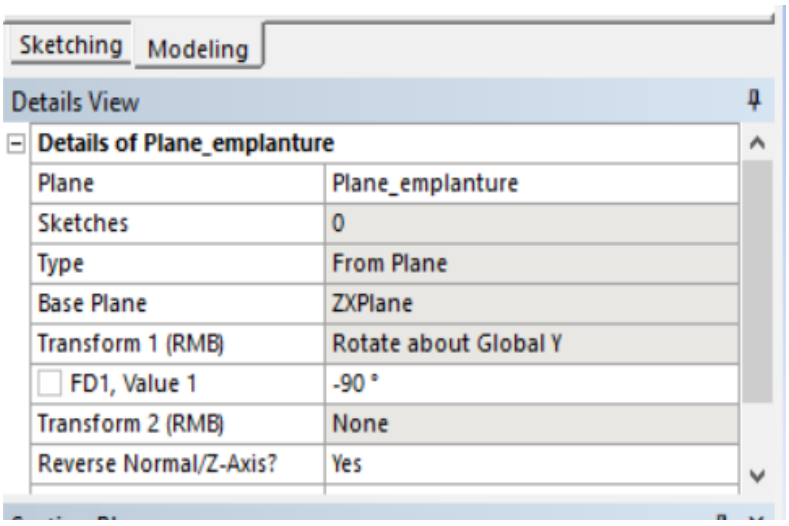
The third exercise involves the design and analysis of a NACA4412 wing, which is a popular airfoil shape known for its aerodynamic efficiency. The wing is specified with a chord length of 1.5 meters and a total length of 2.5 meters. The design process begins by employing the scale function to adjust the dimensions of the wing, ensuring that it meets the required specifications for the CFD analysis.

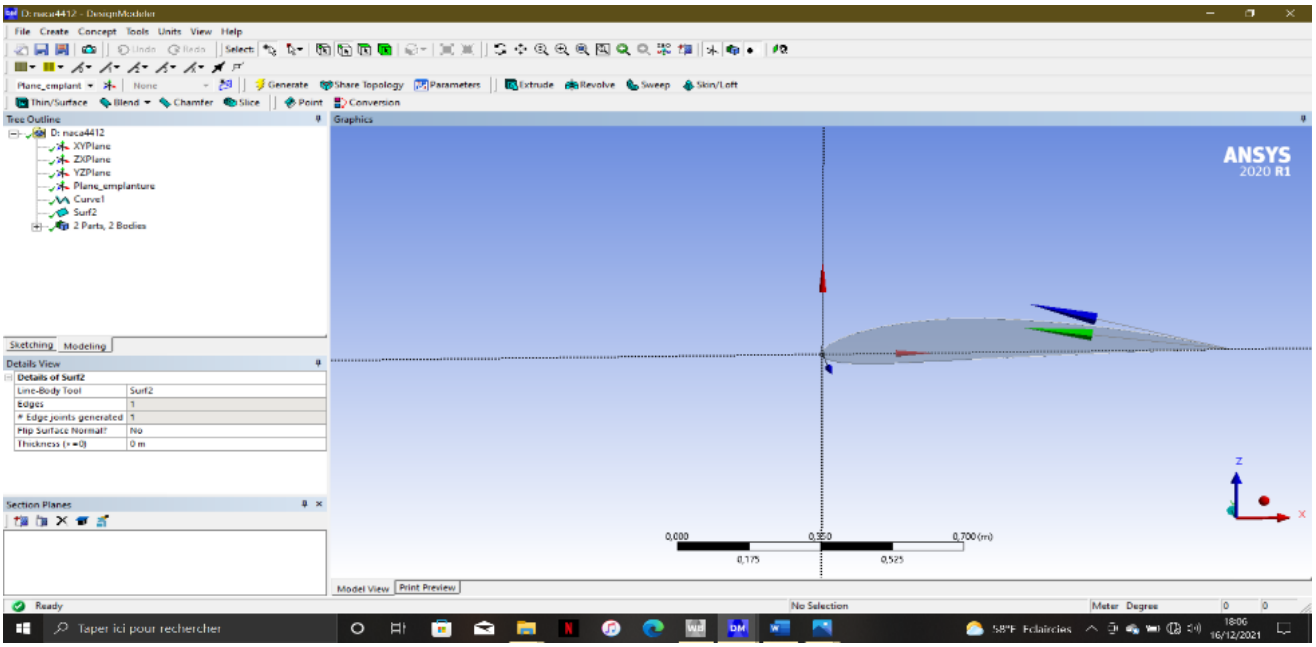
Following the scaling process, the extrude function is utilized to create the three-dimensional shape of the wing from its two-dimensional profile. This step is crucial for developing the realistic geometry necessary for accurate fluid flow simulation. Additionally, the boolean subtract function is applied to refine the shape and incorporate any necessary features or modifications to the wing design.

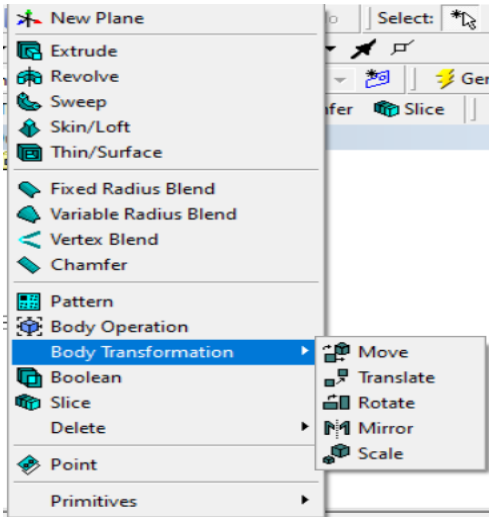
Once the wing geometry is established, the CFD analysis focuses on solving the airflow around the NACA4412 wing at a specified inlet speed of 30 m/s. The analysis is conducted using a mass density of 1.225 kg/m³, which corresponds to standard atmospheric conditions at sea level. This simulation aims to provide insights into the lift and drag characteristics of the wing, offering valuable data for further aerodynamic studies and optimization.

The results from this CFD analysis will contribute to a deeper understanding of the aerodynamic performance of both the Boeing 737 model and the NACA4412 wing, aiding in the development of more efficient aircraft designs and enhancing the overall knowledge of fluid dynamics in aviation.

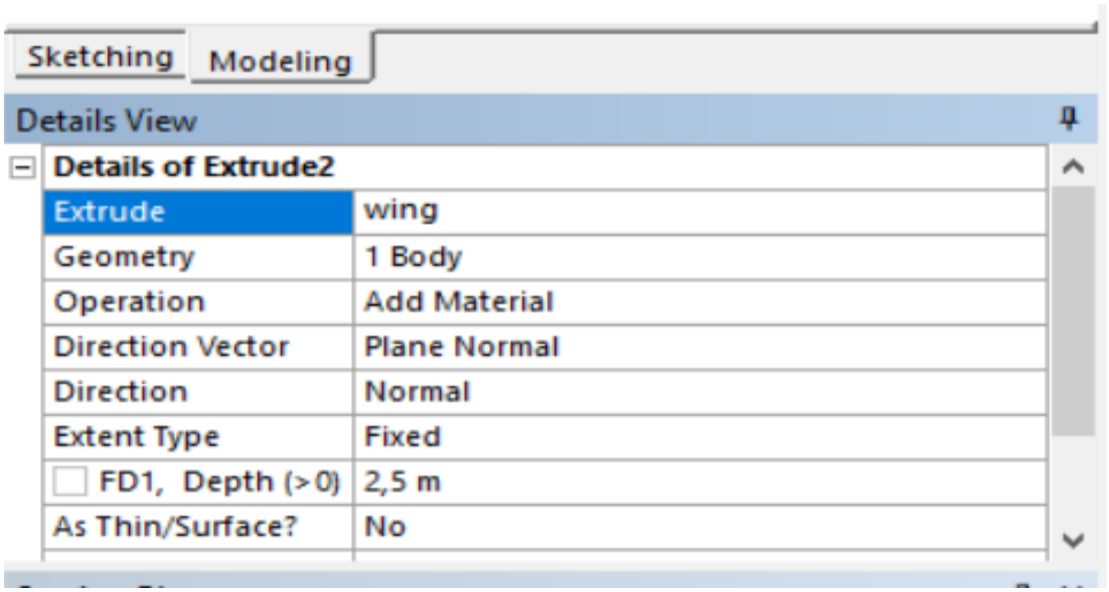
Export







Using the extrude function:

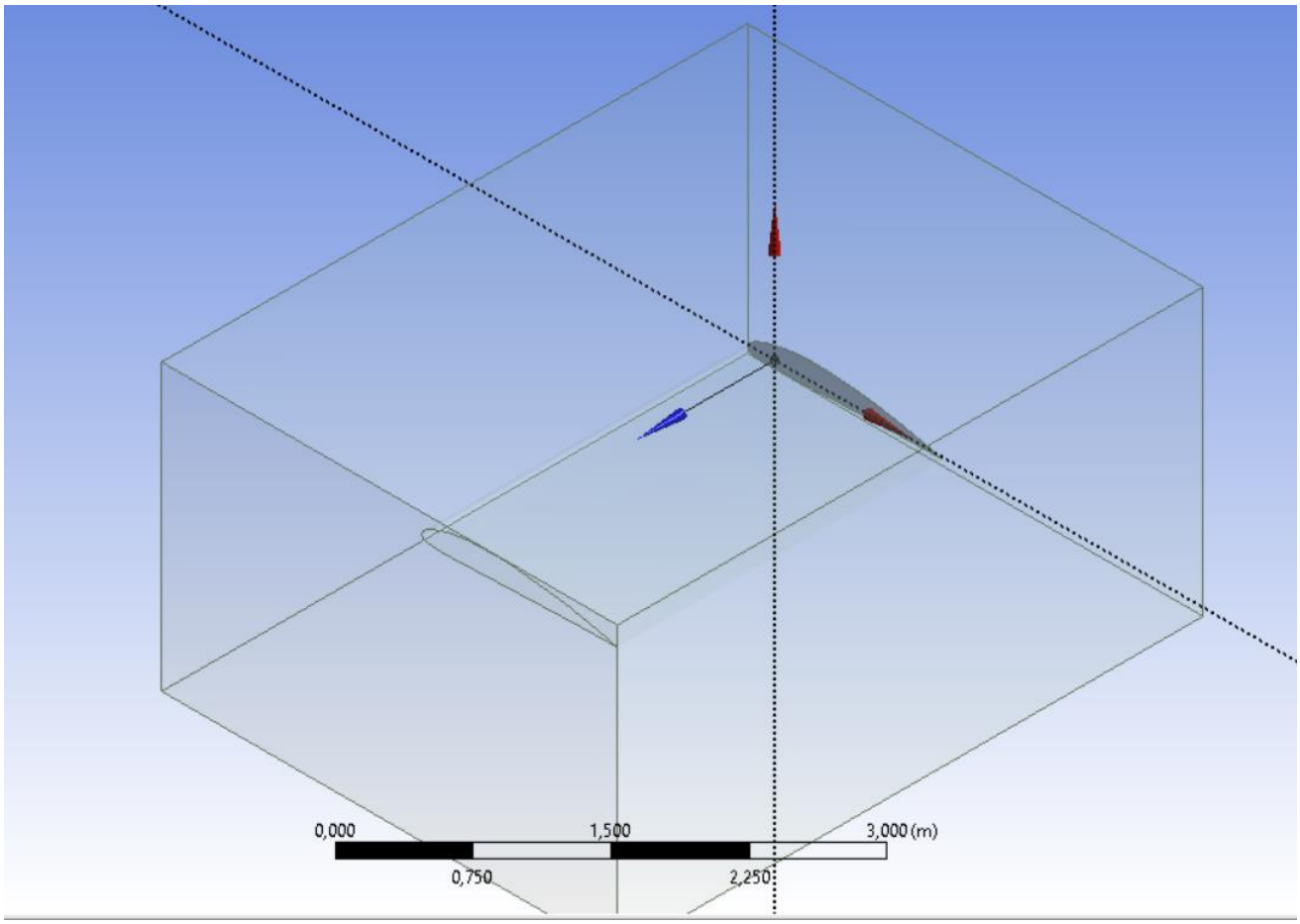


Use the boolean subtract function:

Sketching | Modeling

Details View

Details of Boolean2	
Boolean	Boolean2
Operation	Subtract
Target Bodies	1 Body
Tool Bodies	1 Body
Preserve Tool Bodies?	No



Solving the flow around this wing for an inlet speed of 30 m/s and a mass density of 1,225 kg/m 3