

ASSIGNMENT-3 : PYTHON WRAPPER TEST CASE

This assignment focuses on the unsteady Conjugate Heat Transfer (CHT) analysis of a flat plate using SU2's Python wrapper interface. The wrapper dynamically modifies the wall temperature of the flat plate over time based on the following temporal relation:

$$\text{WallTemp} = 293.0 + 257.0 * \sin(\pi * 0.5 * \text{time})$$

(Oscillates between 36°C (309K) and 550°C (823K) with 0.5Hz frequency)

The simulation is governed by the Reynolds-Averaged Navier-Stokes (RANS) equations and employs the Shear Stress Transport (SST) turbulence model. The setup corresponds to a direct, steady-state CFD problem without axisymmetric assumptions. Additionally, restart functionality is disabled, and input files are preserved to ensure reproducibility and transparency of the simulation setup.

CONFIGURATION DETAILS:

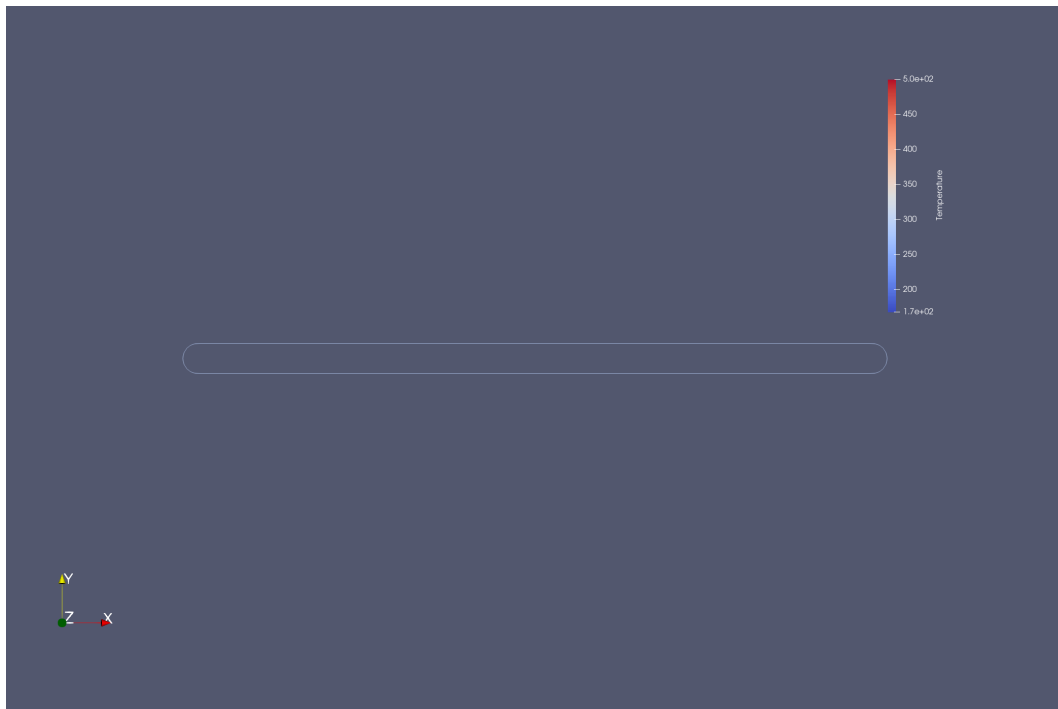
1. Solver Configuration:

- Unsteady RANS formulation with dual-time stepping
- SST turbulence model (Menter's k- ω SST)
- Coupled heat transfer between fluid and solid domains
- Second-order spatial discretization
- Implicit time integration

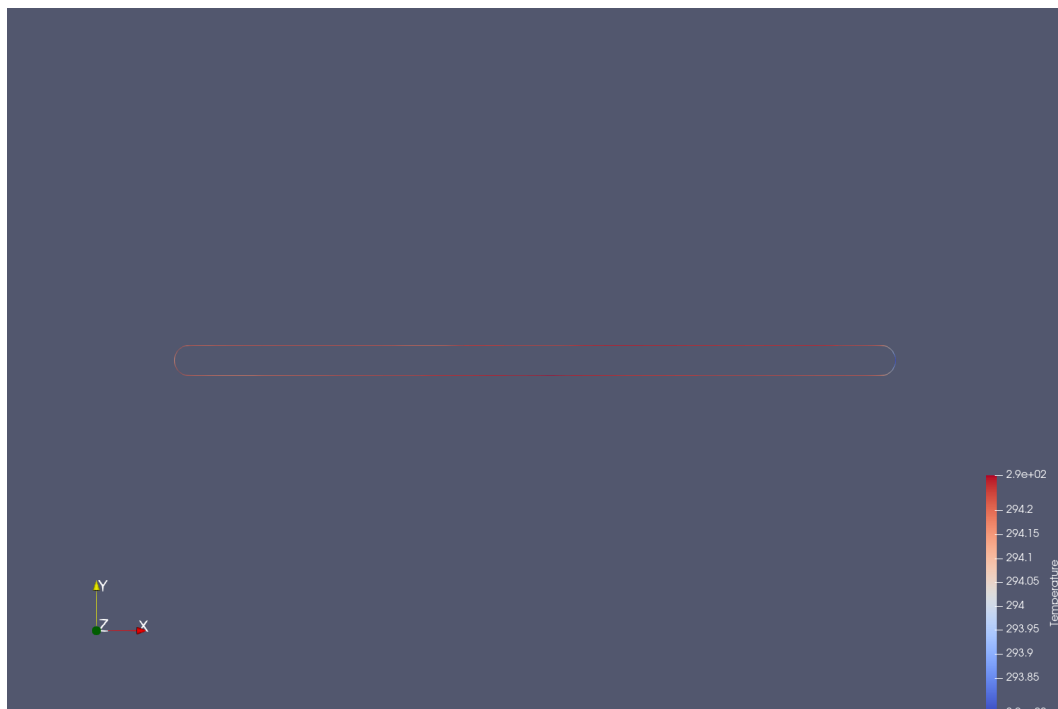
2. Computational Setup:

- Fluid domain: Compressible air (ideal gas)
- Solid domain: Aluminum plate ($k=237$ W/m-K)
- Mesh: Structured grid with $y^+ < 1$ for wall resolution
- Time step: 0.01s (CFL=5)
- Total duration: 10s (1000 iterations)

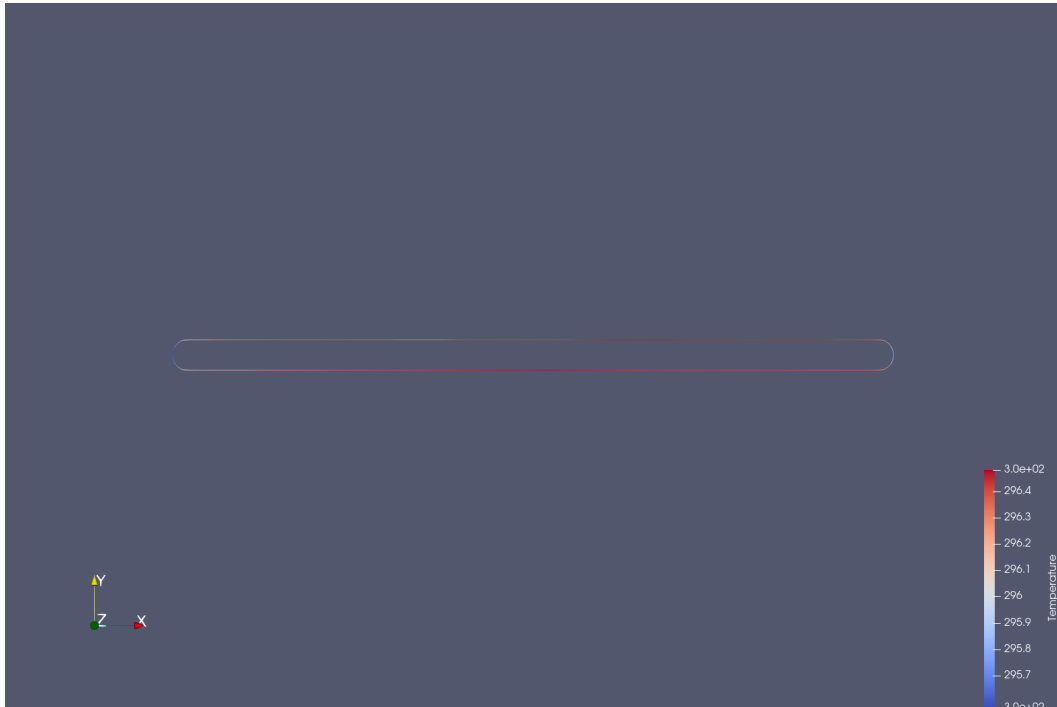
OUTPUTS:



The Temperature Value At Time = 0.11111



The Temperature Value At Time = 0.33333



The Temperature Value At Time = 0.66666



The Temperature Value At Time = 0.99999

