# ASSIGNMENT-4: MODIFICATION OF THE PYTHON WRAPPER SETUP

This test case implements a Python-controlled spatially varying wall temperature boundary condition for a steady-state compressible turbulent flat plate simulation using SU2 v8.1.0. The configuration utilizes the Spalart-Allmaras (SA) turbulence model to simulate the flow over a flat plate with length 0.01687 units.

# **CONFIGURATION DETAILS:**

### 1. Temperature Profile:

Wall temperature varies linearly from 300K to 500K along the plate's length. Implemented through the Python wrapper using:

Temperature = 300.0 + 200.0 \* (x\_coord/plate\_length)

Temperature bounds are physically constrained between 300K and 500K.

#### 2. Solver Configuration:

RANS solver with SA turbulence model Steady-state simulation (TIME\_MARCHING=NO) Roe scheme with MUSCL reconstruction Euler implicit time discretization

Adaptive CFL number (5.0 initial value)

#### 3. Boundary Conditions:

plate: (MARKER\_PYTHON\_CUSTOM)

farfield: Standard farfield boundary condition No inlet/outlet required (simple flat plate case) Isothermal reference temperature of 300K

#### 4. Mesh Characteristics:

2D structured mesh

16,600 quadrilateral elements

16,800 grid points

200 boundary elements on plate surface

Physical dimensions: 0.01687 (length) × 0.00149269 (height)

#### 5. Numerical Parameters:

Reynolds number: 5×10<sup>6</sup> (based on plate length)

Mach number: 0.2

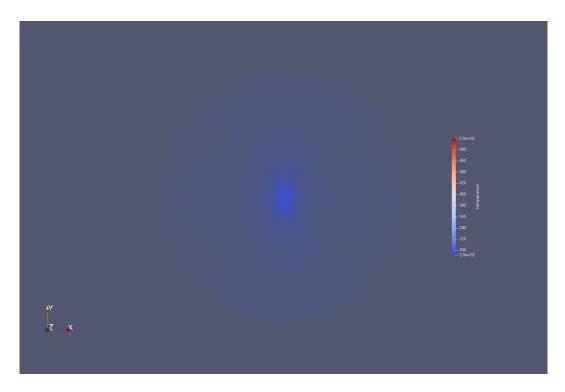
Reference pressure: 101325 Pa Freestream temperature: 293.15 K

Sutherland's law for viscosity

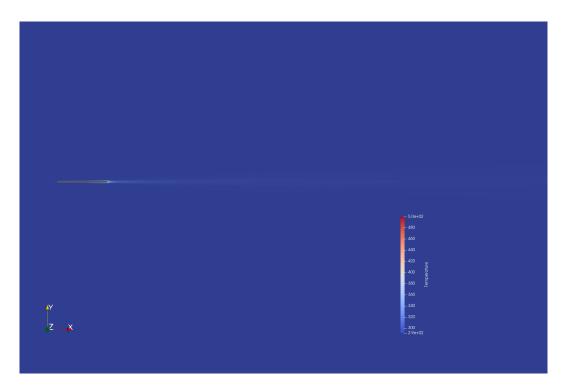
## 6. Output Configuration:

Monitoring of RMS density and turbulence residuals Surface and volume output in VTU format History file recording iterations and forces

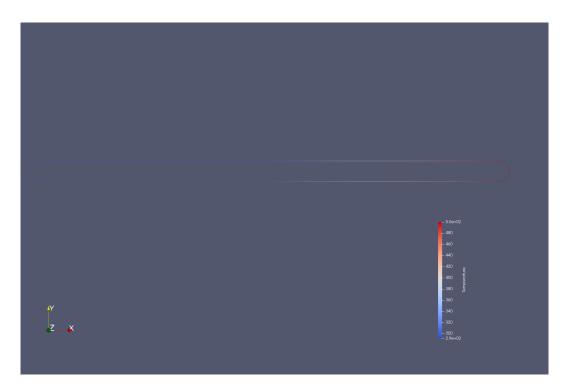
# **OUTPUTS:**



Showing spatially varying temperature in WIREFRAME view



Showing spatially varying temperature in SURFACE view



Showing spatially varying temperature in FEATURE EDGE view