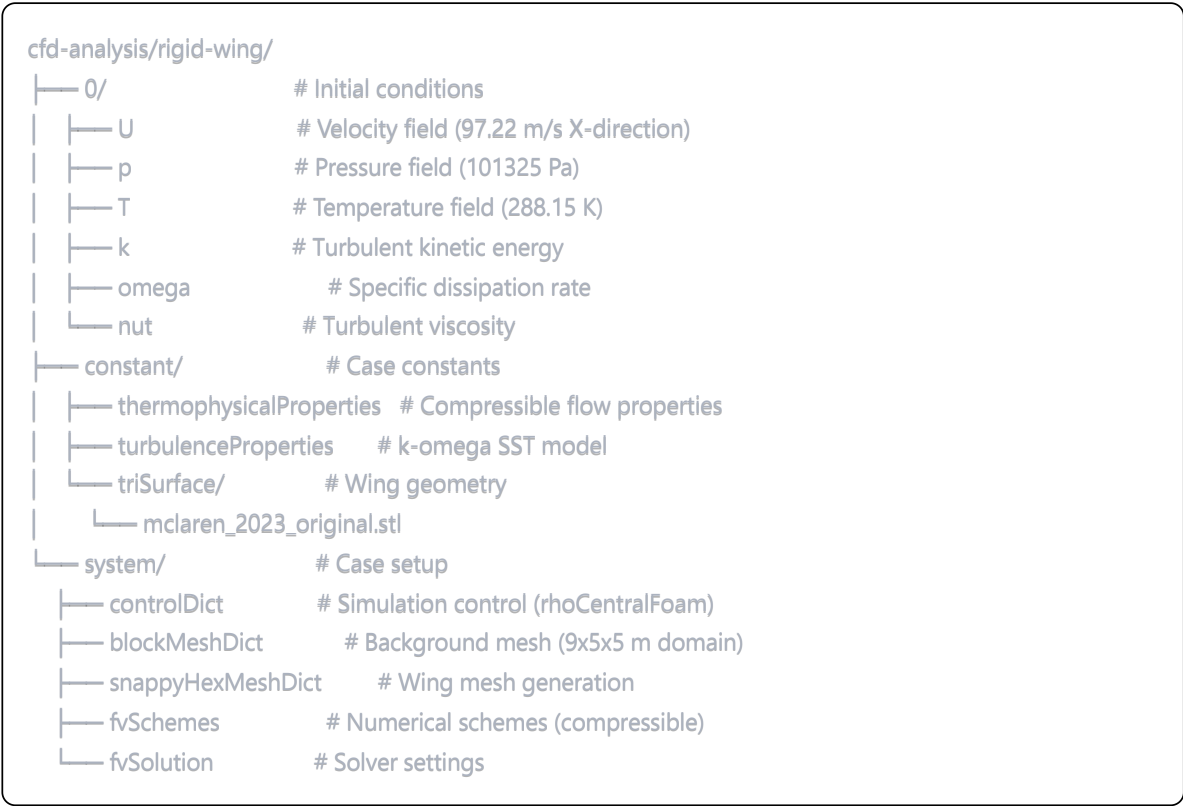


Complete OpenFOAM Case Files for McLaren 2023 Wing

Rigid Wing Case Structure



Key Configuration Details

Flow Conditions (350 km/h Compressible)

- **Velocity:** 97.22 m/s (350 km/h)
- **Mach Number:** ~0.284 (compressible regime)
- **Pressure:** 101325 Pa (sea level)
- **Temperature:** 288.15 K (15°C)
- **Solver:** rhoCentralFoam (density-based compressible)

Mesh Setup

- **Domain:** X[-3 to 6], Y[-2.5 to 2.5], Z[-2 to 3] meters
- **Background cells:** 90×50×50 = 225,000 cells
- **Refinement:** Level 2-3 around wing (conservative for stability)
- **X-direction flow:** Inlet at X=-3, Outlet at X=+6

Turbulence Model

- **Model:** k- ω SST (excellent for automotive aerodynamics)
- **Turbulent intensity:** 5%

- **Turbulent length scale:** 0.1 m
- **Wall functions:** For boundary layer treatment

Boundary Conditions

- **Inlet:** Fixed velocity (97.22, 0, 0) m/s
- **Outlet:** Fixed pressure 101325 Pa
- **Walls:** No-slip condition
- **Wing surface:** No-slip with wall functions

Running the Case

1. Setup Case

```
bash

cd cfd-analysis/rigid-wing

# Copy STL file
cp ../geometry/mclaren_2023_original.stl constant/triSurface/

# Generate background mesh
blockMesh

# Generate wing mesh
snappyHexMesh -overwrite
```

2. Initialize Flow

```
bash

# Set up compressible initial conditions
```