WEEK 9: SIMULATION SET UP

- **Simulation Set Up**

➢ Geometry Import

Import the geometry files of Model 1 and Model 2 for the horizontal 3 blade wind turbine.

➢ Engine settings:

- Select 3d Kernel, Single Phase External as flow model and Isothermal in Thermal model.

- Leave the default Turbulence settings

➢ Environment Settings
  - Set the Domain type to Virtual wind tunnel

  - Leave to zero the Ext. acceleration laws

  - Initial conditions: Wind tunnel default

  - Keep the Front Reference area and Automatic Reference velocity

  - Introduce the wind tunnel Dimensions: 4.44 x 0.914 x 1.22 m. By default the wind tunnel is centered at (0,0,0)

  - Change the wind tunnel Position (0.8,0,0) m.

- Enable the Ground Wall, with Automatic Ground wall type and Ground wall velocity law X: 0

- Set the Lateral Boundaries Periodic and the inlet Boundary Conditions as Velocity

- Velocity laws X: 20 m/s, Y:0 m/s, Z: 0 m/s

➤ Material settings

- Keep the default parameters of Gas, which by default correspond to those of air which has a density of 1.225 kg/m3.

➤ Geometry settings

In the Blades rotate at a constant speed of 600 rpm, 1800 rpm and 3000 rpm. To this end proceed with following setup:

- Shape: SD8000_with_pitchangle or SD8000_without_pitchangle.(Name of folders that contains 2 HAWT models)

- Behaviour: Enforced

- Scale: 1

- Position laws: X: 0.1 m, Y:0 m, Z: 0 m for placing the geometry at the center.

- Angles mode: Euler Angles

- Angular laws: X: 0 deg, Y:-3600t deg (only for 600 rpm) Z: 90 deg

- Boundary conditions: Wall, wall model is Automatic, Wall roughness is 0 m and Immersed Boundary Method is Off

- ➢ Simulation settings
  - Set the Simulation time to 5 seconds

  - Time step mode will be Fixed automatic with Courant:1

  - Set 0.05 metres for Resolved scale

- ➢ Calculation procedure
  - Save project

  - Set the number of CPUs

  - Press Run button

  - Finally read data from Function Viewer for mean torque values.