

General procedure to calculate the torque on the Savonius rotor.

CFD (Computational Fluid Dynamics) simulations are carried out in Comsol Multiphysics software to simulate a wind flow with constant direction and speed, affecting the Savonius rotor's surface. This to calculate the force exerted by the wind on the surface of the rotor blades.

Once the fluid flow simulation has been carried out, the magnitude of pressure exerted on each of the blades' surface is integrated, thereby obtaining the force applied to the surface of each blade. Subsequently, a difference in forces between the blades is calculated to achieve the magnitude and direction of the total force exerted on the rotor. Finally, the length of the blades concerning the center of the rotor is taken as the lever arm. The total force previously calculated multiplies this length, with which an estimate of the Torque or Total Torque exerted on the Savonius rotor is obtained.

This procedure is repeated, varying the angle of rotation of the rotor for the direction of the wind. This is to estimate a Torque or Torque curve in the rotor as a function of said angle of rotation.