

Q1. Momentum theory or disk actuator theory is a theory describing a mathematical model of an ideal actuator disk such as a propeller or helicopter rotor. It was developed by W.H. Rankine, Alfred George Greenhill and Robert Edmund Froude. The rotor is modeled as an infinitely thin disk, inducing a constant velocity along the axis of rotation.

For a stationary rotor such as a wind turbine, the power required to produce a given thrust

$$P = \sqrt{\frac{T^3}{2\rho A}}$$

where

T is the thrust

ρ is the density of air

A is the area of the rotor disk