

1 Nomenclature

1.1 General

- U : velocity (vector or magnitude – magnitude is normally designed as U_o) [m/s]
- p : pressure [Pa]
- P : power [W]
- ρ : density [kg/m³]
- A : area (cross-sectional or projected) [m²]
- Q : volumetric flow rate [m³/s]
- R : radius (typically, fixed) [m]
- r : radius (typically, variable) [m]
- D : diameter [m]
- L : length [m]
- η : efficiency [-]
- ω : rotation rate [rad/s]
- n : rotation rate [rpm]
- T : thrust (force in direction of flow) [N]
- τ : torque [N-m]

1.2 Wind-specific

- a : axial-induction factor [-]
- a' : angular-induction factor [-]
- F : tip-loss correction [-]
- α : angle of attack [degrees or radians]
- φ : angle of relative wind [degrees or radians]
- θ_p : blade pitch angle [degrees or radians]
- θ_T : blade twist angle [degrees or radians]
- B : number of blades [-]
- c : airfoil chord length [m]
- t : airfoil thickness [m]
- σ : solidity [-]
- λ : tip-speed ratio [-]
- λ_r : local-speed ratio [-]
- N : number of blade elements

1.3 Hydropower-specific

- f : friction factor [-]
- H : head [m]

2 Subscripts

2.1 General

- ∞ or 'o': free-stream location, far from moving surfaces

2.2 Power

- *no subscript*: mechanical power
- *e*: electric

- *resource*: (e.g., “wind” or “w”) raw resource

2.3 Efficiency

- *o*: balance of system: everything downstream of the primary conversion to mechanical power
- *no subscript*: conversion of available resource to electrical
- *water-to-wire*: cumulative efficiency of converting hydropower resources to useful electricity
- *wind-to-wire*: cumulative efficiency of converting wind resources to useful electricity

2.4 Wind-specific

- *L*: lift
- *D*: drag
- *rel*: relative wind
- *N*: normal
- *T*: tangential
- *i*: blade element

2.5 Hydropower-specific

- *j*: jet (Pelton turbines)