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## LIST OF SYMBOLS

$A_{\text{chord}}$	-	Blade area between $b_i$ and $b_o$
$A_{\text{ring}}$	-	Annulus area between $b_i$ and $b_o$
AOA	-	Blade section angle of attack
$a$	-	Axial induction factor
$a'$	-	Angular induction factor
B	-	Number of blade
$b_i$	-	Inner station span / R
$b_o$	-	Outer station span / R
$\Delta b$	-	Station span
$c$	-	Local blade chord
$C_D$	-	Blade section drag coefficient
$C_F$	-	Thrust coefficient
$C_L$	-	Blade section lift coefficient
$C_P$	-	Power coefficient
$C_{P'}$	-	Section power coefficient
$C_Q$	-	Torque coefficient
$C_{q'}$	-	Section torque coefficient
$C_x$ or $C_t$	-	Blade section force coefficient (turbine plane)
$C_y$ or $C_n$	-	Blade section force coefficient (axial)
D	-	Drag
G	-	Gear ratio
$I_F$	-	Excitation current (field current)
$I_G$	-	Output current of generator
$i$	-	Transmission ratio
L	-	Lift
$n_{\text{cut-in}}$	-	Cut-in speed (rpm) of generator

$n_G$	-	RPM of generator shaft
$n_r$	-	RPM of wind turbine rotor shaft
$P_{in}$	-	Power input of generator
$P_{out}$	-	Power output of generator
$P_{shaft}$	-	Shaft power
$Q_{shaft}$	-	Torque at the shaft of the wind turbine rotor
$Q_{start}$	-	Starting torque of wind turbine rotor
$R$	-	Radius of the rotor / tip radius
$r$	-	Rotor radii
$T$	-	Blade tangential force
$TSR$	-	Tip speed ratio
$U_G$	-	Terminal voltage of the generator
$u$	-	Blade tangential speed
$V$	-	Wind speed
$V_1$	-	Wind speed at upstream of rotor or initial velocity
$V_2$	-	Wind speed through turbine rotor plane
$V_3$	-	Wind speed at downstream of rotor or final velocity
$V_{cut-in}$	-	Cut-in wind speed
$V_{cut-out}$	-	Cut-out wind speed
$V_\infty$	-	Free stream wind speed
$w_\infty$	-	Swirl velocity
$\alpha$	-	Wind shear exponent
$\phi$	-	Relative flow angle
$\eta_{B-P}$	-	Efficiency of belt-pulley
$\eta_{Gr}$	-	Efficiency of gear
$\eta_G$	-	Efficiency of the generator
$\eta_{G(E)}$	-	Efficiency of the excitation of the generator
$\eta_{Tr}$	-	Efficiency of the transmission (friction loss)
$\lambda$	-	Tip speed ratio
$\rho$	-	Density of the air
$\Omega$	-	Turbine angular velocity

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