

List of Symbols

A	area
a	sonic velocity, position of maximum camber
b	passage width, maximum camber
C_f	tangential force coefficient
C_L, C_D	lift and drag coefficients
C_p	specific heat at constant pressure, pressure coefficient, pressure rise coefficient
C_{pi}	ideal pressure rise coefficient
C_v	specific heat at constant volume
C_X, C_Y	axial and tangential force coefficients
c	absolute velocity
c_o	spouting velocity
D	drag force, diameter
D_{eq}	equivalent diffusion ratio
D_h	hydraulic mean diameter
E, e	energy, specific energy
F_c	centrifugal force in blade
f	acceleration, friction factor
g	gravitational acceleration
H	head, blade height
H_E	effective head
H_f	head loss due to friction
H_G	gross head
H_S	net positive suction head (NPSH)
h	specific enthalpy
I	rothalpy
i	incidence angle
K, k	constants
K_N	nozzle velocity coefficient
L	lift force, length of diffuser wall
l	blade chord length, pipe length
M	Mach number
m	mass, molecular 'weight'
N	rotational speed, axial length of diffuser
N_S	specific speed (rev)
N_{SP}	power specific speed (rev)
N_{SS}	suction specific speed (rev)
n	number of stages, polytropic index
p	pressure

p_a	atmospheric pressure
p_v	vapour pressure
Q	heat transfer, volume flow rate
q	dryness fraction
R	reaction, specific gas constant
Re	Reynolds number
R_H	reheat factor
R_o	universal gas constant
r	radius
S	entropy, power ratio
s	blade pitch, specific entropy
T	temperature
t	time, thickness
U	blade speed, internal energy
u	specific internal energy
V, v	volume, specific volume
W	work transfer
ΔW	specific work transfer
w	relative velocity
X	axial force
x, y, z	Cartesian coordinate directions
Y	tangential force, actual tangential blade load per unit span
Y_{id}	ideal tangential blade load per unit span
Y_k	tip clearance loss coefficient
Y_p	profile loss coefficient
Y_S	net secondary loss coefficient
Z	number of blades, Ainley blade loading parameter
α	absolute flow angle
β	relative flow angle
Γ	circulation
γ	ratio of specific heats
δ	deviation angle
ε	fluid deflection angle, cooling effectiveness
ζ	enthalpy loss coefficient, total pressure loss coefficient
η	efficiency
Θ	minimum opening at cascade exit
θ	blade camber angle, wake momentum thickness
λ	profile loss coefficient
μ	dynamic viscosity
ν	kinematic viscosity, blade stagger angle, velocity ratio
ρ	density
σ	slip factor, solidity
σ_b	blade cavitation coefficient
σ_c	Thoma's coefficient, centrifugal stress
τ	torque

ϕ	flow coefficient, velocity ratio
Ψ	stage loading factor
Ω	speed of rotation (rad/s)
Ω_S	specific speed (rad)
Ω_{SP}	power specific speed (rad)
Ω_{SS}	suction specific speed (rad)
ω	vorticity
$\overline{\omega}$	stagnation pressure loss coefficient

Subscripts

av	average
c	compressor, critical
D	diffuser
e	exit
h	hydraulic, hub
i	inlet, impeller
id	ideal
is	isentropic
m	mean, meridional, mechanical, material
N	nozzle
n	normal component
o	stagnation property, overall
p	polytropic, constant pressure
R	reversible process, rotor
r	radial
rel	relative
s	isentropic, stall condition
ss	stage isentropic
t	turbine, tip, transverse
v	velocity
x, y, z	cartesian coordinate components
θ	tangential

Superscript

	time rate of change
-	average
'	blade angle (as distinct from flow angle)
*	nominal condition