NOMENCLATURE

a	speed of sound (m/s), Chapter 3
a_1, a_2, a_3	coefficients used in Eq. (9.2), Chapter 9
A	area (m^2) Chapters 2–9
A'	parameter to be used in Bowring correlation, Chapter 8
A_{frontal}	projected bubble area (m^2), Chapter 1
b	bubble height (m), Chapter 3
B	matrix, Chapters 4 and 7
b_1, b_2, b_3, b_4	experimentally obtained coefficients used in Kandlikar CHF correlation, Chapter 8
B_1, B_2	constants in Bowring correlation, Chapter 8
c	ratio between the liquid and vapor kinematic viscosity, dimensionless, Chapter 5
C	Shah's fitting coefficient, dimensionless, Chapter 5
C	constant that depends on the flow regime, dimensionless, Chapter 5
C'	parameter to be used in Bowring correlation, Chapter 8
C_1, C_2	constants, Chapter 3
Ca	capillary number, dimensionless, Chapter 8
C_D	drag coefficient, dimensionless, Chapter 1
Co	confinement number, dimensionless, Chapter 1
Co_{FG}	Fogg–Goodson confinement number, dimensionless, Chapter 3
c_p	specific heat (kJ/kg °C), Chapter 4
D	diameter (m), Chapters 4 and 8
D_b	bubble diameter (m), Chapter 1
D_h	hydraulic diameter (m), Chapters 1, 8, and 9
D_{he}	hydraulic diameter to be used in Ong and Thome CHF correlation (m), Chapters 1 and 8
D_{th}	hydraulic diameter (m), Chapters 1 and 8
f	friction factor, dimensionless, Chapters 3, 5, and 9
F	dimensionless parameter to be used with Taitel and Dukler, Chapter 2
F	shape factor, Chapter 3

F	force per unit channel length (N/m), Chapters 4, 6, and 7
F_1, F_2, F_3, F_4	constants used in Bowring correlation, Chapter 8
Fr	Froude number, dimensionless, Chapter 2
F_s	surface tension force (N), Chapter 1
g	gravitational constant (m/s^2), Chapters 1, 5, and 8
$g(x)$	function given in Eq. (9.2), Chapter 9
G	mass flux (kg/m^{2}s), Chapters 1, 4, 5, 6, 8, and 9
h	heat transfer coefficient (W/m^{2}K), Chapters 2, 3, and 8
h	channel height (m), Chapter 3
h	specific enthalpy (kJ/kg), Chapters 8 and 9
H	channel height (m), Chapter 8
h_{LG}	latent heat of vaporization (kJ/kg), Chapters 2–4 and 8
I	identity matrix, Chapter 7
j	superficial velocity (m/s), Chapter 2
k	thermal conductivity (W/m K), Chapter 3
k	constant, dimensionless, Chapter 4
K	dimensionless parameter to be used with Taitel and Dukler, Chapter 2
K	minor losses and losses across the valve, dimensionless, Chapters 3 and 5
K	parameter used in Eq. (8.2) (W/m^2), Chapter 8
$K_{2,CHF}$	Kandlikar number used in Kandlikar CHF correlation, Chapter 8
L	length (m), Chapters 1, 3, and 5–9
L^+	dimensionless length, dimensionless, Chapter 5
$\dot{m}$	mass flow rate (kg/s), Chapters 3, 4, 6,7, and 9
M	matrix, Chapter 7
M	pressure drop multiplier, Chapter 8
$\bar{M}$	molecular mass (g/mol), Chapter 8
n	polytropic constant, dimensionless, Chapter 6
n	constants to be used in Bowring correlation, Chapter 8
p	pressure (N/m^2), Chapters 2–9
Po	Poiseuille number, dimensionless, Chapter 5
q''	heat flux (W/m^2), Chapters 3, 4, and 8
q''_{co}	heat flux parameter used in Eq. (8.2) (W/m^2), Chapter 8
q''_{mkv}	predicted maximum heat flux from the kinetic theory (W/m^2), Chapter 8
Q	volumetric flow rate (m^3/s), Chapter 2
$\dot{Q}$	heat transfer rate (W), Chapters 2, 8, and 9

r	radius (m), Chapter 3
r	pressure drop ratio, dimensionless, Chapter 4
r_c	surface cavity's mouth radius (m), Chapter 3
R	radius of curvature (m), Chapters 2 and 3
$\overline{R}$	universal gas constant [kJ/(kmol K)], Chapter 8
Re	Reynolds number, dimensionless, Chapters 1, 3, 5, and 8
s	specific entropy (kJ/kg K), Chapter 2
s	pressure drop gradient (with respect to mass flow rate) (m^2/s), Chapter 7
t	time (s), Chapters 3, 4, 6, and 7
T	temperature (K or °C), Chapters 2–5 and 8
T	dimensionless parameter to be used with Taitel and Dukler, Chapter 2
u	velocity (m/s), Chapter 3
U	velocity (m/s), Chapters 1 and 5
v	specific volume (m^3/kg), Chapter 2
V	volume (m^3), Chapters 3–7
w	channel width (m), Chapter 3
W	channel width (m), Chapter 8
We	Weber number, dimensionless, Chapter 8
x	distance from channel's inlet (m), Chapter 3
x	mass quality, dimensionless, Chapters 5, 8, and 9
X	Martinelli parameter, dimensionless, Chapters 2 and 5
X	dependent variable, Chapter 4
X	mass flow rate perturbation vector, Chapter 7
y	perpendicular distance from heat transfer surface (m), Chapter 3
z	distance from channel's inlet (m), Chapters 2 and 4–7
z	bubble length (m), Chapter 3

Greek Symbols

α	void fraction, Chapter 5
β	ratio between channel height-to-width, dimensionless, Chapter 3
δ	boundary thickness (m), Chapter 3
Δ	difference, Chapters 2, 3, and 8
ϕ^2	two-phase frictional multiplier, dimensionless, Chapter 5
λ	eigenvalue of matrix B, Chapter 7
μ	dynamic viscosity (kg/m s), Chapters 1, 4, 5, and 8
ν	kinematic viscosity (m^2/s), Chapters 2–4
θ	dimensionless temperature, Chapter 3
θ	angle (rad), Chapter 5
θ_R	receding contact angle, 8

ρ	density (kg/m^3), Chapters 1 and 3–9
σ	surface tension (N/m), Chapters 1–3 and 8
τ	time constant (s), Chapter 3

Subscripts

a	accelerational
b	bubble
c	surface cavity's mouth, contraction, channel, critical pressure, mass quality of unity at the exit
CC	conventional scale channels
ch	cross-sectional
CHF	critical heat flux
CL	contact line
con	confinement
D	demand
D_h	based on hydraulic diameter
e	exit
f	frictional
F	Fanning
fd	fully developed
g	gravitational
G	gas
h	head
h	hydraulic
HFM	homogenous flow model
i	initial
in	in
j	index number
L	liquid
m	mean
MC	microchannel
microchannel	microchannel
ni	no instability (without instability)
ns	nucleation size
o	out
OFI	onset of flow instability
or	orifice
oriface	orifice
s	surface, surge tank
S	supply

sat	saturation
SFM	separated flow model
sp	single phase
sub	subcooled
T	thermal
T	total
tp	two phase
trans	transitional
visc	viscous
w	wall
∞	at the bulk