Notation

It is necessary to mention that the notation fluctuates for the following reasons:

- We want to stick to the notations of the original sources in order to make the book a useful reference for those following current literature, having certain adopted conventions.
- Simultaneously we wish to adhere to some fixed notations, as regards the book as a whole, to make the text coherent without too much duplication of necessary definitions
- We do not wish to overload the notation with multiple definitions within one section, even though following just conventions from the literature would lead to such "context-sensitive" notation.

For this reason several symbols below have multiple meanings, all of which it would be impractical to list. The meanings given below are meant to be looked up whenever the immediate context within some section does not clarify the definition used.

Accents

$\hat{}$	per unit mass
	unit vector
	Fourier transformed
	transformed according to Equation 12.6
$\dot{}$	time derivative
$\bar{}$	closure of a set
	label
$\tilde{}$	used as a label
	indicates no summation over this repeated index
	separately defined transpose of a high-rank tensor

Mathematical Symbols

$\imath$, i	imaginary unit $\sqrt{-1}$
∇	Nabla operator

D/Dt	material derivative (Equation 1.2)
$\oint$	integration over closed contour or surface
^{c}	complex conjugation
^{o}	interior of a set
^{t}	(pre- or post-) transposing operator
O	order symbol for asymptotic rate bound
$\cdot$	dot product in 3-D space
$\times$	cross product in 3-D space
$[\cdot,\cdot]$	closed interval (set on real line)
	discrete inner product
$(\cdot,\cdot)$	open interval (set on real line)
$\langle\cdot,\cdot\rangle$	inner product
$\langle\cdot\rangle$	average
$\vert$	used to precede condition in conditional probabilities
$\vert\cdot\vert$	absolute value
	Euclidean norm
	surface area
$\rightarrow$	goes to, approaches
$\leftarrow$	substitution of "right object" for "left object"
$\gg$	much greater than
$\sim$	asymptotically equal
$\Vert$	parallel
$\perp$	orthogonal
Δ	difference
Δ	function (Table 3.2, p. 55)
	area (of a boundary element)
$*$	adjoint
	complex conjugate
	label
	reflected field
tr	trace, sum of diagonal elements of a matrix
$\leq$	for symmetric matrices the partial ordering based on positivity of the difference matrix

Calligraphic

$\mathcal{D}^n_m$	see Equation 18.43
$\mathcal{E}^n_m$	see Equation 18.44
$\mathcal{F}$	Fourier transform operator
	linear functional
$\mathcal{F}^n_m$	see Equation 18.45
$\mathcal{G}$	Oseen tensor (Equation 2.9)
$\mathcal{G}_n$	Gegenbauer function (p. 101)
$\mathcal{H}_n$	Gegenbauer function (p. 101)

$\mathcal{H}$	Stokeson (p. 52)
	deflated double layer operator, such that $1+\mathcal{H}$ is invertible
$\tilde{\mathcal{H}}$	$\mathcal{H}$ further deflated (Equation 17.58)
$\mathcal{I}$	function defined by an integral (p. 71)
$\mathcal{K}$	linear operator
$\mathcal{K}_n$	solution of Gegenbauer's Equation (p. 101)
$\mathcal{M}$	mirror reflection operator (Equation 12.4)
$\mathcal{P}$	pressure field of Oseen tensor (Equation 2.10), also equal to the flow field of a point source
	orthogonal projection
$\mathcal{P}_L$	"left" projection (Equation 17.52)
$\mathcal{P}_R$	"right" projection (Equation 17.53)
$\mathcal{S}$	linear functional
	symmetry parameter (p. 326)
$\mathcal{T}$	linear functional

Special Labels

Amb	ambient
b	buoyancy
	bubble
Br	Brownian
c	constant
	container
cr	center of resistance
D	disturbance
e	external
E	related to fundamental (focal) ellipse (see p. 54)
eff	effective (see p. 30)
f	fluid
g	gravity
h	homogeneous solution
H	hydrodynamic
	stress coefficient (Section 5.6)
m	mass
p	particle(s)
	particular solution
RBM	rigid-body motion
∞	asymptotic, ambient
r	physical component in direction of e_r
	rotary
s	surface
S	Smoluchowski slip velocity (p. 142)
t	total

w	wall
x	physical component in direction of e_x
y	physical component in direction of e_y
z	physical component in direction of e_z
θ	physical component in direction of e_θ
ϕ	physical component in direction of e_ϕ
$\perp$	perpendicular to axis of symmetry
$\parallel$	parallel to axis of symmetry

Roman Symbols

a	parameter, for ellipsoids see p. 53
A	Hamaker's constant
	area
b	parameter, for ellipsoids see p. 53
c	parameter, often concentration, for ellipsoids see p. 53
C	space of continuous functions
D	diffusion coefficient
	differential operator (Table 3.2, p. 55)
	dissipation rate in given volume
D_x^2	differential operator (p. 62)
e	eccentricity of a spheroid (p. 61)
	the fundamental charge
E	rate of energy dissipation
	transformed eccentricity of a spheroid (Table 3.5, p. 65)
	strength of electric field
E^2	streamfunction operator (Equation 4.42)
f	function
	singularity density function in Equation 3.4
F	function
g	(given) function (in an equation)
G	ellipsoidal harmonic (Table 3.2, p. 55)
H	scaled ellipsoidal harmonic, see Equation 3.7
I	function defined by an integral (p. 71)
	interval
$I_{\rho\rho}$, etc.	components of Fourier decomposed double layer kernel, see Section 18.7.1
J	Jacobian for multidimensional integration
k	Boltzmann constant
	thermal conductivity
	parameter, for Fourier analysis see Equation 18.25
K	kernel function of an integral equation
L	representative length
L_2	Hilbert space of square summable functions
l	parameter, for Fourier analysis see Equation 18.24

m	mass
	meters
	interfacial mobility (Section 9.4)
n	concentration (number per unit volume) of a chemical species
N	null space of an operator (*i.e.*, kernel, the inverse image of zero)
p	pressure
P	Peclet number (p. 127)
	probability density
p_n	solid spherical harmonic of order n
P_n^m	associated Legendre function
P_n	spherical harmonic
	Legendre polynomial
q	function (Table 3.2, p. 55)
Q_n	second-kind Legendre function
$Q_{m-1/2}^n$	toroidal function (references in Section 18.4)
r	radial coordinate of spherical polars, distance from origin
	aspect ratio of a spheroid
r_{xy}	Euclidean distance of $\boldsymbol{x}$ and $\boldsymbol{y}$
R	gas constant
	curvature radius
	separation of particle centers
	range of an operator (*i.e.*, set of images)
Re	Reynolds number
S	surface
Sl	Strouhal number (p. 147)
t	time
	parameter
T	temperature (absolute)
U	internal energy
V	volume
	representative speed
x	Cartesian coordinate
	length of vector $\boldsymbol{x}$
X^A, etc.	resistance functions, see Equations 5.25–30
y	Cartesian coordinate
Y^A, etc.	resistance functions, see Equations 5.25–30
Y_n^m	spherical harmonic (p. 94)
$\tilde{Y}_n^m$	normalized spherical harmonic (p. 94)
z	Cartesian coordinate
	valence of a chemical species
Z^M	resistance function, see Equation 5.30

Bold Roman

$\boldsymbol{a}$	acceleration
	tensor element in mobility matrix (p. 115)
$\boldsymbol{A}$	tensor in resistance matrix (p. 109)
$\boldsymbol{b}$	tensor element in mobility matrix (p. 115)
$\boldsymbol{B}$	tensor in resistance matrix (p. 109)
$\boldsymbol{c}$	tensor element in mobility matrix (p. 115)
$\boldsymbol{C}$	tensor in resistance matrix (p. 109)
$\boldsymbol{d}$	displacement
	unit vector along symmetry axis
$\boldsymbol{e}$	rate of deformation tensor
	unit vector of some coordinate system
$\boldsymbol{E}$	electric field
	body force field
$\boldsymbol{F}$	force
$\boldsymbol{g}$	tensor element in mobility matrix (p. 115)
$\boldsymbol{G}$	tensor in resistance matrix (p. 109)
$\boldsymbol{h}$	tensor element in mobility matrix (p. 115)
$\boldsymbol{H}$	tensor in resistance matrix (p. 109)
$\boldsymbol{k}$	argument of 3-D Fourier transformed function (Ex. 2.9)
$\boldsymbol{L}$	linear operator
$\boldsymbol{m}$	tensor element in mobility matrix (p. 115)
$\boldsymbol{M}$	tensor in resistance matrix (p. 109)
$\boldsymbol{n}$	unit surface normal
$\hat{\boldsymbol{n}}$	unit surface normal pointing into the interior fluid domain (*i.e.*, the region physically occupied by fluid)
$\boldsymbol{P}$	strength of multipole moment
$\boldsymbol{q}$	heat flux
$\boldsymbol{Q}$	electric charge
$\boldsymbol{r}$	position vector
$\boldsymbol{r}_{xy}$	vector from $\boldsymbol{x}$ to $\boldsymbol{y}$ $(= \boldsymbol{y} - \boldsymbol{x})$
$\boldsymbol{U}$	translation velocity
$\boldsymbol{S}$	stresslet
$\boldsymbol{T}$	torque or the corresponding second order tensor
	traction surface field
$\boldsymbol{v}$	velocity field
$\boldsymbol{V}$	single layer generated velocity field (Equation 15.4, p. 377)
$\boldsymbol{W}$	double layer generated velocity field (Equation 15.6, p. 377)
$\boldsymbol{x}$	Cartesian position vector

Greek

α	real number
α_t, α_i	scale factors dependent on surface areas (Section 17.6)
β	real number
	ratio of sphere radii
γ	Euler's constant
$\dot{\gamma}$	shear rate
δ	Kronecker delta
	Dirac delta function
ϵ	transformed eccentricity of a spheroid (Table 3.5, p. 65)
	electric permittivity (ϵ_0 for vacuum)
	gap distance
	small real number
ζ	inverse mobility
	zeta potential
	Riemann zeta function
θ	polar spherical coordinate
	angular cylindrical coordinate (Section 9.2)
κ	bulk viscosity (footnote on p. 8)
	inverse Debye length (p. 137)
	viscosity ratio (Chapter 6)
	negative of the ratio of interior and exterior dissipation rates (Section 17.2.1)
λ	eigenvalue
	viscosity ratio
	ellipsoidal coordinate (Table 3.2, p. 55)
	ratio of length scales (Chapter 6)
Λ	transformed viscosity ratio (p. 250)
μ	viscosity
ν	kinematic viscosity (μ/ρ)
ξ	parameter describing separation of two spheres (p. 272)
π	pi, 3.14159...
π_n	solid spherical harmonic (p. 87)
Π	pressure field generated by a double layer (Equation 15.7, p. 377)
ρ	density
	radial cylindrical coordinate
ρ_e	charge density
Υ	differential operator (p. 228)
ϕ	angular spherical or cylindrical coordinate
	electric potential
ϕ_i	basis functions in some expansion
Φ	spherical harmonic
Φ_v	dissipation rate per unit volume (p. 14)

χ	polar spherical coordinate (Section 9.2)
χ_n	solid spherical harmonic of order n
ψ	Stokes stream function
ψ_0	surface potential (electric)
ω_i	quadrature weight on approximate integration
Ω	set
	pressure field generated by a single layer (Equation 15.5, p. 377)

Bold Greek

$\boldsymbol{\delta}$	identity tensor (footnote on p. 8)
$\boldsymbol{\epsilon}$	alternating tensor (footnote on p. 28)
$\boldsymbol{\eta}$	position vector of a surface point
$\boldsymbol{\xi}$	position vector of a surface point
$\boldsymbol{\sigma}$	stress tensor
$\boldsymbol{\Sigma}$	stress field of the Oseen–Burgers tensor (Section 2.4.1)
$\boldsymbol{\varphi}$	double layer density
$\boldsymbol{\psi}$	single layer density
$\boldsymbol{\omega}$	particle angular velocity
$\boldsymbol{\Omega}$	fluid angular velocity