

2.1 Notation

Mathematics is, of course, a vast subject, and so here we concentrate on those mathematical methods and relationships that are most often applied in the physical sciences and engineering.

Although there is a high degree of consistency in accepted mathematical notation, there is some variation. For example the spherical harmonics, Y_l^m , can be written Y_{lm} , and there is some freedom with their signs. In general, the conventions chosen here follow common practice as closely as possible, whilst maintaining consistency with the rest of the handbook.

In particular:

scalars	a	general vectors	$\mathbf{a}$
unit vectors	$\hat{\mathbf{a}}$	scalar product	$\mathbf{a} \cdot \mathbf{b}$
vector cross-product	$\mathbf{a} \times \mathbf{b}$	gradient operator	∇
Laplacian operator	∇^2	derivative	$\frac{df}{dx}$ etc.
partial derivatives	$\frac{\partial f}{\partial x}$ etc.	derivative of r with respect to t	$\dot{r}$
n th derivative	$\frac{d^n f}{dx^n}$	closed loop integral	$\oint_L dl$
closed surface integral	$\oint_S ds$	matrix	$\mathbf{A}$ or a_{ij}
mean value (of x)	$\langle x \rangle$	binomial coefficient	$\binom{n}{r}$
factorial	$!$	unit imaginary ($\mathbf{i}^2 = -1$)	$\mathbf{i}$
exponential constant	e	modulus (of x)	$ x $
natural logarithm	$\ln$	log to base 10	$\log_{10}$

