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Shipbuilding and marine structures — Symbols for computer applications

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Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 7463 was prepared by Technical Committee ISO/TC 8, *Shipbuilding and marine structures*.

Annex A forms an integral part of this International Standard.

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Shipbuilding and marine structures — Symbols for computer applications

1 Scope

This International Standard specifies symbols for dimensional quantities used in shipbuilding and related branches of marine technology for use in computer applications where the available character set is restricted. The symbols are capable of being represented using the 26 alphabetic and 10 numeric characters of the standard FORTRAN character set (see ISO 1539) and are also within the scope of International Alphabet No. 2 (AI2) of the International Telecommunication Union.

Examples of application of the symbols may be as names of variables in computer programs and as abbreviations in output listings.

This International Standard specifies the symbols to be used but does not attempt to provide definitions for the quantities represented. The notes and formulae in the columns headed "Explanation" in the tables of symbols presented in annex A are provided as guidance to the application of the symbol. The use of standard symbols does not absolve authors from the need to define the quantities concerned.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1539 : 1980, *Programming Languages—FORTRAN.*

3 Derivation of symbols

3.1 Origin

The symbols are based on a list approved by the International Towing Tank Conference (ITTC), Ottowa, 1975, and a related list produced by the International Ship Structures Congress (ISSC), in 1974. In the few instances where it has been necessary to remove incompatibilities between the two lists, preference has been given to the ITTC symbols for subjects A.1 and A.4 and to the ISSC symbols for subjects A.5 and A.6 (see annex A).

3.2 General principles

The following general principles have been applied in assembling the symbols.

a) Only those alphabetic and numeric characters which are common to the character sets in clause 1 are used in the construction of symbols.

b) No distinction is made between upper and lower case alphabetic characters.

c) Punctuation and other special characters are not used.

d) Every symbol begins with an alphabetic character.

e) No symbol contains more than five characters, including subscripts.

f) Symbols which are frequently used are kept as short as possible, consistent with the avoidance of ambiguity.

g) The same symbol is not used to represent different quantities within closely related areas of application.

Where practicable, the symbols for the restricted character set are related to the symbols commonly used for the quantities concerned as adopted by the ITTC and ISSC. The following conventions are employed.

a) Where the usual symbol incorporates a Greek letter, the name of the character is spelled out, sometimes in abbreviated form.

b) Subscripts and indices are suffixed to the main symbol on the same line and without spacing or parenthesis.

c) The Froude "circular" symbols are represented by the prefix CIRC.

d) The suffix M or S may be added to any symbol to distinguish between the values for model or ship respectively.

Consistency with established symbols is considered more important than compatibility with the FORTRAN convention which reserves names beginning with I, J, K, L, M and N for integer variables. It is therefore suggested that programmers should prefix symbols which conflict with the convention with a suitable character.

In maintaining the relationship with established symbols it has been necessary to make use of both the alphabetic character O and the numeric 0 (zero). It is therefore necessary to ensure that printers used for output in which the symbols appear make a clear distinction between the forms of these two characters.

4 Standard symbols

The symbols are presented in annex A which forms an integral part of this International Standard. They are grouped under the following subject headings:

A.1 General

A.2 Geometry of ship and propeller

A.3 Resistance and propulsion

A.4 Seakeeping and manoeuvrability

A.5 Strength of structures

A.6 Vibration

The first column in the tables gives the Restricted Character Set symbol (R.C.S.).

The second column, under the heading "Usual symbol", gives the symbol approved by the International Towing Tank Conference or the International Ship Structures Congress for use in ordinary letter-press work. In some instances an alternative is included. The English name of a Greek letter is given in parenthesis at its first occurrence.

The third column gives the name or descriptive title of the quantity represented by the symbol.

Where clarification is considered necessary this is given under the heading "Explanation" in the fourth column.

For further clarification, the dimensions of the quantity are stated in the final column.

Within the subject headings the quantities are arranged in alphabetical order of the usual symbol, the Greek alphabet following the Roman.

Annex A
(normative)

Tables of Roman character set symbols

NOTE — Symbols are classified by subject; they are arranged alphabetically within a given classification.

A.1 General

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
ACC	a	Linear acceleration	dv/dt	LT^{-2}
A	A	Area in general		L^2
AT	A_T	Cross-sectional area of an experiment tank or tunnel		L^2
B	B	Breadth in general		L
CO	c	Velocity of sound		LT^{-1}
VWG	c_G	Group velocity of waves		LT^{-1}
C	C	Coefficient		—
D	D, d	Diameter in general		L
E	E	Energy in general		$L^2 MT^{-2}$
FC	f	Friction coefficient	Ratio of tangential force to normal force between two sliding bodies or planes	—
F	F	Force in general		LMT^{-2}
CQF	F	Entrainment factor	$\frac{1}{U_\delta} dQ/dx$	—
G	g	Acceleration due to gravity		LT^{-2}
DE	h	Depth in general		L
H	h	Head, pressure, in general	Height of column of liquid of specified density supported	L
HBL	H	Boundary layer shape parameter	δ^*/θ	—
HT	H	Total head, Bernoulli	$h + p/w + q/w$	L
HQF	H_E	Entrainment shape parameter	$(\delta - \delta^*)/\theta$	—
HK	k	Roughness height or magnitude	Roughness height often expressed as some form of average	L
SK	K_s	Sand roughness	Mean diameter of the equivalent sand grains covering a surface	L
L	L	Length in general		L
LW	L_W, λ (lambda)	Wavelength	From crest to crest	L
MA	m	Mass		M
M	M	Moment in general		$L^2 MT^{-2}$

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
N	n	Rate of revolution		REVS.T^{-1}
PR	p	Pressure intensity	Force per unit area	$L^{-1}MT^{-2}$
PRC	p_c	Pressure in a cavity		$L^{-1}MT^{-2}$
PRV	p_V	Vapour pressure of water		$L^{-1}MT^{-2}$
PRU	P_U	Ambient pressure in undisturbed flow		$L^{-1}MT^{-2}$
P	P	Power in general	E/t	L^2MT^{-3}
PRD	q	Dynamic pressure	$\frac{1}{2}\varrho U^2$	$L^{-1}MT^{-2}$
QF	Q	Rate of flow	Volume of fluid per unit time	L^3T^{-1}
QF	Q	Entrainment	$\int_0^\delta \bar{U}\,dy$	L^2T^{-1}
RD	r,R	Radius in general		L
RDC	R_C	Radius of curvature		L
RDH	R_H	Radius, hydraulic	Area of section divided by wetted perimeter	L
SP	s	Length along path		L
TI	t	Time in general		T
TEM	$t°$	Temperature in general		—
TC	T	Period of time for a complete cycle		T
UFL	u	Velocity fluctuations in boundary layer	$\frac{1}{T}\int_0^T u\,dt = 0$	LT^{-1}
UTAU	u_τ	Shear (friction) velocity	$U_\delta\sqrt{C_\tau/2} = \sqrt{\tau_W/\varrho}$	LT^{-1}
UFLM	$\bar{u}$	Mean of velocity fluctuations		LT^{-1}
UFLS	u'	Standard deviation of root mean square value of velocity fluctuations	$u'^2 = \frac{1}{T}\int_0^T u^2\,dt$	LT^{-1}
UL	U_δ	Velocity at the edge of the boundary layer at $y = \delta$		LT^{-1}
UM	$\bar{U}$	Time mean of velocity in boundary layer	$\frac{1}{T}\int_0^T U\,dt$	LT^{-1}
UMPR	$\bar{U}_P$	Velocity change in boundary layer due to pressure gradient		LT^{-1}
UMK	$\bar{U}_R$	Velocity defect in boundary layer due to roughness		LT^{-1}
VX, VY, VZ	u, v, w	Velocity components in direction of x, y, z axes		LT^{-1}
U, V	U, V	Linear velocity	ds/dt	LT^{-1}
VOL	V	Volume in general		L^3

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
WPVOL	w	Weight density	ϱg	$L^{-2} MT^{-2}$
WT	W	Weight in general		LMT^{-2}
X, Y, Z	x, y, z	Body axes and Cartesian coordinates	Right hand orthogonal system of axes fixed in the body. The x-axis is forward and parallel to the reference or base line used to determine the body shape. For dynamic considerations the origin should be at the centre of gravity of the body and the z-axis vertically upwards. The y-axis is to port.	L
X0, Y0, Z0	x_0, y_0, z_0	Fixed axes and corresponding Cartesian coordinates	Right hand orthogonal system of axes nominally fixed in relation to the earth; the positive z-axis is vertically upwards, and the x-axis lies in the general direction of initial motion	L
CTHEX	α (alpha)	Coefficient of thermal expansion (linear)	Elongation per unit length per degree change in temperature	—
ACCA	α	Angular acceleration	$\mathrm{d}\omega/\mathrm{d}t$	T^{-2}
SPECG	γ (gamma)	Specific gravity	Weight of a substance divided by the weight of an equal volume of distilled water at 4 °C	—
ADEX	γ	Adiabatic exponent		—
GAM	γ	Vortex density	Strength per length or per area of vortex distribution	—
CIR	Γ (capital gamma)	Circulation	$\oint V \mathrm{d}s$ along a closed line	$L^2 T^{-1}$
DLTB	δ (delta)	Thickness of a boundary layer in general		L
CDAM	δ	Damping coefficient	When F is a function of time given by $F(t) = Ae^{-\delta t} \sin \left\{ \frac{2(t-t_0)}{T} \right\}$	—
DLTB	δ^*, δ_1	Displacement thickness of boundary layer	$\int_0^\delta \left\{ 1 - \frac{U}{U_\delta} \right\} \mathrm{d}y$	L
TETM	θ (theta)	Momentum thickness	$\int_0^\delta \frac{U}{U_\delta} \left(1 - \frac{U}{U_\delta} \right) \mathrm{d}y$	L
TETE	θ^*	Energy thickness	$\int_0^\delta \frac{U}{U_\delta} \left(1 - \frac{U^2}{U_\delta^2} \right) \mathrm{d}y$	L
TETP	θ	Angle of pitch or trim (Positive bow down)		—
CAP	κ (kappa)	Coefficient of kinematic capillarity	σ/ϱ	$L^3 T^{-2}$
MU	μ (mu)	Coefficient of dynamic viscosity	Shear stress per unit velocity gradient	$L^{-1} MT^{-1}$
NU	ν (nu)	Coefficient of kinematic viscosity	μ/ϱ	$L^2 T^{-1}$
RHO	ϱ (rho)	Mass density	Mass per unit volume	ML^{-3}

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
RHOP	ϱ_P	Propeller mass density	Propeller mass per unit volume	ML^{-3}
CAPC	σ (sigma)	Capillarity constant	Surface tension per unit length	MT^{-2}
TAUW	τ_W (tau)	Hydrodynamic shear stress at a wall		$L^{-1} MT^{-2}$
POTF	ϕ (phi)	Potential function, such as velocity potential		$L^2 T^{-1}$
PHIR	ϕ	Angle of roll, heel or list (Positive starboard side down)		—
PHI	ϕ	Phase difference		—
PHI0	ϕ_0	Phase angle, according to $\cos(\omega t + \phi_0)$		—
STRF	ψ (psi)	Stream function	ψ = constant is the equation of a stream line	$L^3 T^{-1}$
PSIY	ψ	Angle of yaw, heading or course (Positive bow to port)		—
OMG	ω (omega)	Angular velocity or circular frequency	Angle per unit time	T^{-1}
OMG0	ω_0	Natural circular frequency		T^{-1}

A.2 Geometry of ship and propeller

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
ABL	A_{BL}	Area of ram bow in longitudinal plane	The area of the ram projected on the middle line plane forward of the fore perpendicular	L^2
ABT	A_{BT}	Area of transverse cross-section of a bulbous bow (full area port and starboard)	The cross-sectional area at the fore perpendicular. Where the waterlines are rounded so as to terminate on the fore perpendicular, A_{BT} is measured by continuing the area curve forward to the perpendicular, ignoring the final rounding[1)]	L^2
AD	A_D	Developed blade area	Developed blade area of a screw propeller outside the boss or hub	L^2
AE	A_E	Expanded blade area	Expanded blade area of a screw propeller outside the boss or hub	L^2
AM	A_M	Area, midship section	Midway between fore and aft perpendiculars	L^2
AO	A_O	Disc area	$\pi D^2/4$	L^2
AP	A_P	Projected blade area	Projected blade area of a screw propeller outside the boss or hub	L^2
AR	A_R	Area of rudder		L^2
ATR	A_T	Area of transom (full area port and starboard)	Cross-sectional area of transom stern below the load waterline	L^2
AV	A_V	Area exposed to wind	Projected area of portion of ship above waterline	L^2
AW	A_W	Area, waterplane		L^2
AX	A_X	Area, maximum transverse section		L^2
XAB	$\overline{AB}$	Longitudinal centre of buoyancy from aft perpendicular[2)]	Distance of centre of buoyancy from aft perpendicular	L
XAF	$\overline{AF}$	Distance of centre of flotation from aft perpendicular[2)]		L
XAG	$\overline{AG}$	Longitudinal centre of gravity from aft perpendicular[2)]	Distance of centre of gravity from aft perpendicular	L
BF	b	Span of an aerofoil or hydrofoil	Tip to tip or support to tip when cantilevered	L
B	B	Beam or breadth, moulded, of ship		L
B	B	Position of centre of buoyancy on drawing		—
CIRCB	Ⓑ	R.E. Froude's breadth coefficient	$B/\nabla^{1/3}$	—
ZBM	$\overline{BM}$	Metacentre above centre of buoyancy[2)]	Distance from the centre of buoyancy B to the transverse metacentre M	L
ZBML	$\overline{BM_L}$	Longitudinal metacentre of buoyancy[2)]		L
BWL	B_{WL}	Breadth on waterline		L
CH	c	Chord length of an aerofoil or hydrofoil		L

1) See A.7, note 1.

2) See A.7, note 2.

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
CHM	$\bar{c}$	Mean chord length	The expanded or developed area of a propeller blade divided by the span from the hub to the tip	L
CB	C_B, δ	Block coefficient	∇ / LBT	—
CBW	$C_{B(W)}$	Block coefficient (e.g. referring to L_{WL} and B_{WL})	$\frac{\nabla}{L_{(WL)} B_{(WL)} T}$	—
CIL	C_{IL}	Coefficient of inertia of waterplane, longitudinal	$12 I_L / BL^3$	—
CWIT	C_{IT}	Coefficient of inertia of waterplane, transverse	$12 I_T / B^3 L$	—
CM	C_M, β (beta)	Midship section coefficient (midway between forward and aft perpendiculars)	A_M / BT	—
CP	C_P, ϕ	Longitudinal prismatic coefficient[1]	$\nabla / A_X L$ (or $\nabla / A_M L$)	—
CPA	C_{PA}, ϕ_A	Prismatic coefficient, afterbody[1]	∇ (afterbody)/$\frac{1}{2} A_X L$ (or ∇ (afterbody)/$\frac{1}{2} A_M L$)	—
CPE	C_{PE}, ϕ_E	Prismatic coefficient, entrance[1]	∇ (entrance)/$A_X L_E$ (or ∇ (entrance)/$A_M L_E$)	—
CPF	C_{PF}, ϕ_F	Prismatic coefficient, forebody[1]	∇ (forebody)/$\frac{1}{2} A_X L$ (or ∇ (forebody)/$\frac{1}{2} A_M L$)	—
CPR	C_{PR}, ϕ_R	Prismatic coefficient, run[1]	∇ (run)/$A_X L_R$ (or ∇ (run)/$A_M L_R$)	—
CS	C_S	Wetted surface coefficient	$S / \sqrt{\nabla L}$	—
CVP	C_{VP}, ϕ_V	Prismatic coefficient, vertical	$\nabla / A_W T$	—
CWP	C_{WP}, α	Design load waterline coefficient	A_W / LB	—
CX	C_X	Maximum transverse section coefficient	A_X / BT where B and T are measured at the position of maximum area	—
CVOL	C_∇	Volumetric coefficient	∇ / L^3	—
DH	d	Boss or hub diameter		L
DP	D	Diameter of a propeller		L
DEP	D	Depth, moulded, of a ship hull		L
CABL	f_{BL}	Longitudinal area coefficient for ram bow	A_{BL} / LT	—
CABT	f_{BT}	Taylor sectional area coefficient for bulbous bow	A_{BT} / A_X	—
FM	f	Camber of an aerofoil or hydrofoil	Maximum separation of median and nose-tail line	L
CATR	f_T	Sectional area coefficient for transom stern	A_T / A_X	—
FREB	F	Freeboard	From the freeboard markings to the freeboard deck, according to official rules	L
F	F	Position of centre of flotation (centroid of waterplane) on drawing		—

1) See A.7, note 3.

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
XFB	$\overline{FB}$	Longitudinal centre of buoyancy from forward perpendicular [1)]	Distance of centre of buoyancy from forward perpendicular	L
XFG	$\overline{FG}$	Longitudinal centre of gravity from forward perpendicular [1)]	Distance of centre of gravity from forward perpendicular	L
G	G	Position of centre of gravity on drawing		—
GM	$\overline{GM}$	Metacentric height [1)]	Distance from the centre of gravity G to the transverse metacentre M	L
GML	$\overline{GM_L}$	Longitudinal metacentric height [1)]	Distance from the centre of gravity G to the longitudinal metacentre M_L	L
GAP	G_Z	Gap between the propeller blades	$2\pi r \sin\phi / Z$	L
GZ	$\overline{GZ}$	Righting arm or lever		L
H0	h_0	Immersion	The depth of submergence of the propeller measured vertically from the shaft axis to the free surface	L
ENTA	i_E	Angle of entrance, half	Angle of waterline at the bow with reference to centreplane, neglecting local shape at stem	—
RAKG	i_G	Rake	The displacement from the propeller plane to the generator line in the direction of the shaft axis. Aft displacement is considered positive rake	L
RUNA	i_R	Angle of run, half	Angle of waterline at the stern with reference to centre plane, neglecting local shape of stern frame	—
RAKS	i_S	Skew-induced rake	The axial displacement of a blade section which occurs when the propeller is skewed. Aft displacement is considered positive	L
RAKT	i_T	Total rake	The sum of the rake and the skew-induced rake	L
IL	I_L	Longitudinal moment of inertia of waterplane	About transverse axis through centre of flotation	L^4
IP	I_P	Polar moment of inertia	Second polar moment of area of a plane surface related to a point in the plane	L^4
IT	I_T	Transverse moment of inertia of waterplane	About longitudinal axis through centre of flotation	L^4
K	K	Keelpoint on drawing		—
ZKB	$\overline{KB}$	Centre of buoyancy above moulded base or keel [1)]	Distance from the centre of buoyancy B to the moulded base or keel K	L
ZKG	$\overline{KG}$	Centre of gravity above moulded base or keel [1)]	Distance from the centre of gravity G to the moulded base or keel K	L
ZKM	$\overline{KM}$	Transverse metacentre above moulded base or keel [1)]	Distance from the transverse metacentre M to the moulded base or keel K	L
ZKML	$\overline{KM_L}$	Longitudinal metacentre above moulded base or keel [1)]		L

1) See A.7, note 3.

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
L	L	Length of a ship	Reference length of a ship (generally between the perpendiculars)	L
ENTL	L_E	Length of entrance	From the forward perpendicular to the forward end of parallel middle body, or maximum section	L
LOA	L_{OA}	Length, overall		L
LOS	L_{OS}	Overall submerged length		L
LP	L_P	Length of parallel middle body	Length of constant transverse section	L
LBP	L_{BP}	Length between perpendiculars		L
RUNL	L_R	Length of run	From section of maximum area or after end of parallel middle body to waterline termination or other designated point	L
LWL	L_{WL}	Length of waterline in general		L
M	M	Position of transverse metacentre on drawing		—
ML	M_L	Position of longitudinal metacentre on drawing		—
CIRCM	Ⓜ	R.E. Froude's length coefficient, or length-displacement ratio	$L/\nabla^{1/3}$	—
PP	P	Propeller pitch in general		L
RD	R	Radius of a propeller		L
S	S	Wetted surface		L^2
CIRCS	Ⓢ	R.E. Froude's wetted surface coefficient	$S/\nabla^{2/3}$	—
TMAX	t	Maximum thickness of an aerofoil or hydrofoil	Measured normal to mean line	L
TT	t	Taylor tangent to the area curve	The intercept of the tangent to the sectional area curve at the bow on the midship ordinate expressed as a ratio of the midship ordinate 1)	—
T0	t_0	Thickness on axis of propeller blade	Thickness of propeller blade as extended down to propeller axis	L
T	T	Draught moulded, of ship		L
TA	T_A	Draught at aft perpendicular		L
TF	T_F	Draught at forward perpendicular		L
CIRCT	Ⓣ	R.E. Froude's draught coefficient	$T/\nabla^{1/3}$	—
WT	W	Displacement weight	$\varrho g \nabla$	LMT^{-2}
XB	X_B	x-coordinate of centre of buoyancy		L
XF	X_F	x-coordinate of centre of flotation		L
XG	X_G	x-coordinate of centre of gravity		L

1) If the sectional area at the end ordinate is not zero (e.g. when there is a bulbous bow) both intercepts should be diminished by that area in evaluating t.

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
XP	X_P	Longitudinal propeller position	Distance of propeller centre forward of the aft perpendicular	L
YP	Y_P	Lateral propeller position	Transverse distance of propeller centre from middle line (wing screws)	L
ZP	Z_P	Vertical propeller position	Height of propeller centre above base line	L
NPB	Z	Number of blades of a propeller		—
MA	Δ (capital delta)	Displacement mass	$\varrho\nabla$	M
RAKA	θ	Angle of rake		—
TETS	Θ_s (capital theta)	Skew angle	The angular displacement about the shaft axis of the reference point of any blade section relative to the generator line measured in the plane of rotation. It is positive when opposite to the direction of rotation ahead	—
SCALE	λ	Scale ratio	Ship dimension/model dimension	—
PHIP	ϕ	Pitch angle of screw propeller	Arc tan $(P/2\pi R)$	—
PHIF	ϕ_F	Pitch angle of screw propeller measured to the face line		—
DISV	∇ (Nabla), V	Displacement volume		L^3
MUVOL	μ	Permeability volume	The ratio of the volume of water entering a compartment to the volume of the compartment.	—

A.3 Resistance and propulsion

A.3.1 General

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
RAUG	a	Resistance augment fraction	$(T - R_T)/R_T$	—
BN	B_n	Boussinesq number	$U/\sqrt{g R_H}$	—
BP	B_P	Taylor's propeller coefficient based on delivered horsepower	$nP_D^{1/2}/V_A^{2\,1/2}$ where n is in r/min, P_D in horsepower[1], V_A in knots	—
BU	B_U	Taylor's propeller coefficient based on thrust horsepower	$nP_T^{1/2}/V_A^{2\,1/2}$ where n is in r/min, P_T in horsepower[1], V_A in knots	—
CA	C_A	Incremental resistance coefficient for model-ship correlation[2]	$R_A / \frac{1}{2}\rho V^2 S$	—
CAA	C_{AA}	Air or wind resistance coefficient	$R_{AA} / \frac{1}{2}\rho V_R^2 A_V$	—
CD	C_D	Drag coefficient	$D / \frac{1}{2}\rho V^2 A$	—
CDVOL	$C_{D\nabla}$	Power-displacement coefficient	$P_D / \frac{1}{2}\rho V^3 \nabla^{2/3}$	—
CFUU	C_f	Local friction coefficient based on undisturbed velocity	$\tau_W / \frac{1}{2}\rho U_U^2$	—
CF	C_F	Specific frictional resistance or drag coefficient	$R_F / \frac{1}{2}\rho V^2 S$	—
DELCF	ΔC_F	Roughness allowance	(Obsolescent, see C_A)	—
CF0	C_{F0}	Frictional resistance coefficient in two-dimensional flow		—
CL	C_L	Lift coefficient	$L / \frac{1}{2}\rho V^2 A$	—
CP	C_P	Power loading coefficient	$P_D / \left(\frac{1}{2}\rho V_A^3 \frac{\pi D^2}{4}\right)$	—
CPV	C_{PV}	Specific pressure resistance coefficient (of viscous origin)	$R_{PV} / \frac{1}{2}\rho V^2 S$	
CQS	C_Q^*	Torque index	$Q / \left\{\frac{1}{2}\rho \{V_A^2 + (0{,}7\pi n D)^2\}(\pi D^3/4)\right\}$	—
CR	C_R	Specific residuary resistance coefficient	$R_R / \frac{1}{2}\rho V^2 S$	—
CT	C_T	Specific total resistance coefficient	$R_T / \frac{1}{2}\rho V^2 S$	—
CTH	C_{Th}	Thrust loading coefficient	$T / \left(\frac{1}{2}\rho V_A^2 \frac{\pi D^2}{4}\right)$	—
CTHS	C_T^*	Thrust index	$T / \left\{\frac{1}{2}\rho \{V_A^2 + (0{,}7\pi n D)^2\}(\pi D^2/4)\right\}$	—
CTL	C_{TL}	Telfer's resistance coefficient	gRL / WV^2	—

1) The unit here is "British" horsepower

1 British horsepower ≡ 550 ft lb/s
≡ 745,7 W

2) For the ship-model correlation allowance, the resistance coefficient of the form C_A corresponding to the resistance form R_A, the suffix A is to denote the additional resistance to be added to the smooth ship prediction to complete the ship-model balance. This allowance covers not only such items as roughness allowance but also the method of extrapolation used and the scale effects on resistance, wake, thrust deduction and other propulsive factors. A coefficient of this kind lends itself to sub-division into different components such as those due to structural roughness (C_{AS}), paint roughness (C_{AP}) and so on.

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
CTQ	C_{TQ}	Qualified resistance coefficient	$C_{T\nabla}/\eta_H \eta_R$	—
CTVOL	$C_{T\nabla}$	Resistance-displacement coefficient	$R_T / {}^1/_2 \varrho V^2 \nabla^{2/3}$	—
CV	C_V	Specific total viscous resistance coefficient	$R_V / {}^1/_2 \varrho V^2 S$	—
CW	C_W	Specific wavemaking resistance coefficient	$R_W / {}^1/_2 \varrho V^2 S$	—
CFUL	C_τ	Local friction coefficient based on velocity at the edge of the boundary layer at $y = \delta$	$\tau_W / {}^1/_2 \varrho U_\delta^2$	—
CIRCC	Ⓒ	R.E. Froude's resistance coefficient	$1\,000\, R/W$ Ⓚ^{2}	—
DR	D	Drag (a force)	Force in the direction of motion, generally for a completely immersed body	LMT^{-2}
FD	F_D	Towing force in a self-propulsion test	Applied to model in propulsion test carried out at the ship propulsion point	LMT^{-2}
FN	F_n	Froude number	$V/\sqrt{gL}$	—
FNH	F_{nh}	Froude depth number	$V/\sqrt{gh}$	—
FNVOL	$F_{n\nabla}$	Speed-displacement coefficient	$V/\sqrt{g\nabla^{1/3}}$	—
FP	F_P	Pull or towing force of a ship		LMT^{-2}
FP0	F_{P0}	Pull during bollard test		LMT^{-2}
CIRCF	Ⓕ	R.E. Froude's frictional resistance coefficient	$1\,000\, R_F/W$ Ⓚ^{2}	—
CCIR	G	Non-dimensional circulation	$\Gamma/\pi D V_A$ or $\Gamma/\pi D V$	—
CIND	I	Induction factor	Ratio between velocities induced by helicoidal and by straight line vortices	—
ADVC	J	Advance coefficient or advance number of propeller	V_A/nD	—
ADVCV	J_V	Apparent or ship speed advance coefficient	V/nD	—
C3	k	Three-dimensional form factor on flat plate friction	$(C_V - C_{F0})/C_{F0}$	—
C1	k_1	Ship-model correlation factor for propulsive efficiency	η_{DS}/η_{DM}	—
C2	k_2	Ship-model correlation factor for propeller rate of revolutions	n_S/n_M	—
CFM3	k_f	Camber correction factor for three-dimensional flow	Maximum geometric camber of propeller or wing section divided by geometric camber of section with the same effective camber in two-dimensional flow	—
CALFT	$k_{\alpha t}$	Angle of attack correction factor for thickness effects	$\alpha_t/(t_0/D)$	—
CALF3	$k_{\alpha S}$	Correction factor for ideal angle of entry in three-dimensional flow	Ratio between ideal angle of entry in three-dimensional and two-dimensional flow $= \alpha_{S3}/\alpha_{S2}$	—

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
KP	K_P	Power coefficient	$P_D/\varrho n^3 D^5$	—
KQ	K_Q	Torque coefficient	$Q/\varrho n^2 D^5$	—
KR	K_R	Resistance coefficient corresponding to K_Q and K_T	$R/\varrho n^2 D^4$	—
KSC	K_{SC}	Centrifugal spindle torque coefficient	$Q_{SC}/\varrho_p n^2 D^5$	—
KSH	K_{SH}	Hydromatic spindle torque coefficient	$Q_{SH}/\varrho n^2 D^5$	—
KSHS	K^*_{SH}	Hydrodynamic spindle torque index	$Q_{SH}/\{1/2\varrho\{V_A^2 + (0{,}7\,\pi nD)^2\}(\pi D^3/4)\}$	—
KT	K_T	Thrust coefficient	$T/\varrho n^2 D^4$	—
KTD	K_{TD}	Duct thrust coefficient	Duct thrust coefficient for a ducted propeller, $T_D/\varrho n^2 D^4$	—
KTP	K_{TP}	Propeller thrust coefficient	Propeller thrust coefficient for a ducted propeller, $T_p/\varrho n^2 D^4$	—
KTT	K_{TT}	Total thrust coefficient for a ducted propeller unit	$K_{TP} + K_{TD}$	—
CIRCK	Ⓚ	R.E. Froude's speed-displacement coefficient	$\sqrt{4\pi/g}\,V/\nabla^{1/6}$	—
FL	L	Lift (a force)	Force in a direction perpendicular to motion	LMT^{-2}
CIRCL	Ⓛ	R.E. Froude's speed-length coefficient	$V/\sqrt{gL/4\pi}$	—
N	n	Rate of revolution		$REVS \cdot T^{-1}$
PB	P_B	Brake power		L^2MT^{-3}
PD	P_D	Delivered power at propeller	$2\pi Qn$	L^2MT^{-3}
PE	P_E	Effective power	RV	L^2MT^{-3}
PI	P_I	Indicated power	Determined from pressure measured by indicator	L^2MT^{-3}
PS	P_S	Shaft power	P_D plus the losses along the shafting	L^2MT^{-3}
PT	P_T	Thrust power	TV_A	L^2MT^{-3}
Q	Q	Torque	Corresponding to delivered power P_D	L^2MT^{-2}
QS	Q_S	Spindle torque	About spindle axis of controllable pitch propeller $Q_S = Q_{SC} + Q_{SH}$ — positive if it increases pitch	L^2MT^{-2}
QSC	Q_{SC}	Centrifugal spindle torque		L^2MT^{-2}
QSH	Q_{SH}	Hydrodynamic spindle torque		L^2MT^{-2}
R3	r	Three-dimensional form factor on flat plate friction	$C_V/C_{F0} = 1 + k$	—
R	R	Resistance in general	Force opposing motion	LMT^{-2}
RN	R_n	Reynolds' number	UL/ν	—
RA	R_A	Model-ship correlation allowance	Additional resistance to be added to the smooth ship prediction to complete the model-ship balance	LMT^{-2}

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
RAA	R_{AA}	Air or wind resistance		LMT^{-2}
RAP	R_{AP}	Appendage resistance		LMT^{-2}
RAR	R_{AR}	Roughness resistance		LMT^{-2}
RF	R_F	Frictional resistance	Due to fluid friction on a surface	LMT^{-2}
RF0	R_{F0}	Frictional resistance in two dimensional flow		LMT^{-2}
RP	R_P	Pressure resistance	Due to the normal stresses over the surface of a body	LMT^{-2}
RPV	R_{PV}	Pressure resistance of viscous origin		LMT^{-2}
RR	R_R	Residual resistance	$R_T - R_F$	LMT^{-2}
RS	R_S	Spray resistance	Due to the generation of spray	LMT^{-2}
RT	R_T	Total resistance	Total towed resistance	LMT^{-2}
RV	R_V	Total viscous resistance	$R_F + R_{PV}$	LMT^{-2}
RW	R_W	Wavemaking resistance	Due to the formation of surface waves	LMT^{-2}
RWB	R_{WB}	Wavebreaking resistance	Associated with the breakdown of the bow wave	LMT^{-2}
RWP	R_{WP}	Wave pattern resistance		LMT^{-2}
SRA	S_A	Apparent slip ratio	$1 - V/nP$	—
SRR	S_R	Real slip ratio	$1 - V_A/nP$	—
SN	S_n	Strouhal number	nL/U where n is the eddy frequency	—
THDF	t	Thrust deduction fraction	$(T - R_T)/T$	—
TH	T	Thrust	At propeller	LMT^{-2}
THDU	T_D	Duct thrust	Thrust of the duct of a ducted propeller	LMT^{-2}
THP	T_P	Propeller thrust	Thrust of propeller in ducted propeller	LMT^{-2}
U	U	Velocity of a fluid		LT^{-1}
UA	U_A	Axial velocity induced by propeller		LT^{-1}
UADU	U_{AD}	Axial velocity induced by duct of ducted propeller		LT^{-1}
UAP	U_{AP}	Axial velocity induced by propeller of ducted propeller		LT^{-1}
UR	U_R	Radial velocity induced by propeller		LT^{-1}
URDU	U_{RD}	Radial velocity induced by duct of ducted propeller		LT^{-1}
URP	U_{RP}	Radial velocity induced by propeller of ducted propeller		LT^{-1}
UT	U_T	Circumferential velocity induced by propeller		LT^{-1}
UTDU	U_{TD}	Tangential velocity induced by duct of ducted propeller		LT^{-1}
UTP	U_{TP}	Tangential velocity induced by propeller of ducted propeller		LT^{-1}

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
UU	U_U	Velocity of undisturbed flow		LT^{-1}
V	V	Speed of ship		LT^{-1}
VA	V_A	Speed of advance of propeller	Speed in relation to water flow	LT^{-1}
VP	V_P	Mean axial velocity at propeller plane of ducted propeller		LT^{-1}
VRES	V_R	Resultant velocity of flow approaching a hydrofoil	Taking vortex induced velocities into account	LT^{-1}
VR	V_R	Wind velocity, relative		LT^{-1}
WFT	w	Taylor wake fraction in general	$(V - V_A)/V$	—
WFF	w_F	Froude wake fraction	$(V - V_A)/V_A$	—
WFTQ	w_Q	Taylor wake fraction determined from torque identity	Speed V_A determined by a comparison between an open-water propeller test and a self-propulsion test, Q and n having the same values in both tests	—
WFTT	w_T	Taylor wake fraction determined from thrust identity	Speed V_A determined by a comparison between an open-water propeller test and a self-propulsion test, T and n having the same values in both tests	—
WN	W_n	Weber number	U^2L/κ	—
XLO	x	Load fraction	In power prediction load factor $(1 + x)$ given by $(1 + x)P_E = \eta_D P_D$	—
ZV	z_V	Bodily sinkage of model or ship due to forward speed		L
ALFA	α	Angle of attack or incidence	Angle between the direction of undisturbed relative flow and the surface or line referred to	—
ALFE	α_E	Effective angle of attack or incidence	The angle of attack relative to the chord line including the induced velocities	—
ALFG	α_G	Geometric angle of attack or incidence	The angle of attack relative to the chord line neglecting the induced velocities	—
ALFI	α_I	Hydrodynamic angle of attack	In relation to the position at zero lift	—
ALF0	α_0	Angle of zero lift	Angle of attack or incidence at zero lift	—
ALFS	α_S	Ideal angle of attack	Angle of attack for thin airfoil or hydrofoil for which the streamlines are tangent to the mean line at the leading edge. This condition is usually referred to as "shock free" entry or "smooth"	—
APSF	β	Appendage scale effect factor	Ship appendage resistance/model appendage resistance	—
BETB	β	Advance angle of a propeller blade section	arc tan $(V_A/2\pi Rn)$	—
BETS	β^*	Effective advance angle	arc tan $(V_A/0,7\pi nD)$	—

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
BETI	β_I	Hydrodynamic pitch angle of a propeller blade section	Flow angle taking into account induced velocity	—
GAMWR	γ_R	Wind direction, relative		—
ADVCT	δ	Taylor's advance coefficient	nD/V_A where n is in r/min, D in feet, V_A in knots	—
ZETO	ζ (zeta)	Static thrust coefficient	A figure of merit for comparing the relative performance of propulsion devices at zero speed $T/\{(\varrho\pi/2)^{1/3}(P_D D)^{2/3}\} = K_T/\{\pi(K_Q)^{2/3}(2)^{1/3}\}$	—
ETA	η (eta)	Efficiency in general		—
ETAB	η_B	Propeller efficiency behind ship	$P_T/P_D = TV_A/2\pi Qn$ T, V_A, Q, n measured in propulsion test	—
ETAD	η_D	Propulsive efficiency or quasi-propulsive coefficient	P_E/P_D	—
ETAG	η_G	Gearing efficiency		—
ETAH	η_H	Hull efficiency	$(1-t)/(1-w)$ $= 1/(1-w)\ (1+a)$ $= (1+w_F)/(1+a)$	—
ETAI	η_I	Ideal propeller efficiency	Efficiency in non-viscous fluid	—
ETAM	η_M	Mechanical efficiency	P_S/P_I or P_B/P_I	—
ETA0	η_0	Propeller efficiency in open water	$P_T/P_D = TV_A/2\pi Qn$ T, V_A, Q, n measured in an open-water test	—
ETAR	η_R	Relative rotative efficiency	η_B/η_0	—
ETAS	η_S	Shafting efficiency	P_D/P_S	—
ETAT	η_T	Thermal efficiency		—
ADVR	λ	Advance ratio of a propeller	$V_A/\pi nD$	—
TAU	τ	Ratio between propeller thrust and total thrust of ducted propeller	$\frac{T_P}{T}$	—

A.3.2 Cavitation

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
GASR	a_s	Gas content ratio	α/α_S	—
DC	D_C	Cavity drag		LMT^{-2}
HTN	H	Net useful head turbo-machines	Total head produced or absorbed by impeller or rotating machines	L
HTU	H_U	Total head upstream	Total head upstream of the impeller of rotating machinery	L
LC	L_C	Cavity length	The streamwise dimension of a fully-developed cavitating region	L
PR	p	Absolute ambient pressure		$L^{-1}MT^{-2}$

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
PRC	p_C	Cavity pressure	Actual pressure within a steady (quasi-steady) cavity	$L^{-1} MT^{-2}$
PRCB	p_{CB}	Collapse pressure	The pressure produced in the field of a collapsing cavitation bubble	$L^{-1} MT^{-2}$
PRI	p_I	Critical pressure	The absolute ambient pressure at which cavitation inception takes place	$L^{-1} MT^{-2}$
PRV	p_V	Vapour pressure of water		$L^{-1} MT^{-2}$
TN	T_n	Thoma number	$\frac{H_U - p_V/w}{H}$	—
UI	U_I	Critical velocity	Free stream velocity at which cavitation inception takes place	LT^{-1}
VOLL	V_L	Volume loss	W_L/w	L^3
WTL	W_L	Weight loss	Weight of material actually eroded from a specimen during a specified time	LMT^{-2}
GAS	α	Gas content	The amount of dissolved and/or undissolved gas in a liquid	ppm or per cent
GASS	α_S	Gas content of the saturated liquid		ppm or per cent
DLTC	δ_C	Cavity thickness	Maximum dimensions of a fully-developed cavity normal to the length dimension	L
CAVC	σ	Cavitation number	$\frac{p - p_C}{q}$	—
CAVV	σ_V	Vapour cavitation number	$\frac{p - p_V}{q}$	—

A.3.3 Tests in ice

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
CI	C_I	Coefficient of net ice resistance		—
CIB	C_{IB}	Coefficient of resistance due to breaking of ice		—
CIF	C_{IF}	Coefficient of friction between hull and ice		—
CII	C_{II}	Coefficient of inertial resistance due to velocity of ship		—
CIS	C_{IS}	Coefficient of resistance due to submersion of ice		—
CIT	C_{IT}	Coefficient of total resistance in ice		—
CIW	C_{IW}	Coefficient of water resistance in the presence of ice		—
HI	h	Thickness of ice sheet		—
RI	R_I	Net ice resistance	$R_{IB} + R_{IF} + R_{II} + R_{IS}$	LMT^{-2}

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
RIB	R_{IB}	Resistance due to breaking of ice		LMT^{-2}
RIF	R_{IF}	Resistance due to friction between hull and ice		LMT^{-2}
RII	R_{II}	Inertial resistance due to velocity of ship	Arising from acceleration forces caused by ice pressure on the hull	LMT^{-2}
RIS	R_{IS}	Resistance due to submersion of ice		LMT^{-2}
RIT	R_{IT}	Total resistance in ice	$R_{IW} + R_I$	LMT^{-2}
RIW	R_{IW}	Water resistance in the presence of ice		LMT^{-2}
SALT	s	Salinity of ice or water	Weight of the salt dissolved divided by the total weight of the salt water	—
DLTI	δ	Deflection of ice sheet		L

A.4 Seakeeping and manoeuvrability

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
AB	A_B	Area of bow hydroplanes		L^2
AC	A_C	Area under cut-up		L^2
AR	A_R	Area of rudder		L^2
AS	A_S	Area of stern hydroplanes		L^2
CFAN	a_n	Hydromatic mass per unit ship length, at n^{th} strip		ML^{-1}
ADISS	$\bar{A}$	Ratio of amplitudes of dissipated waves at infinity to the amplitude of relative vertical motion		—
ATN	A_n	Area of transverse section at n^{th} strip		L^2
CFBN	b_n	Hydrodynamic damping per unit ship length by wave dissipation at n^{th} strip		$L^{-1} MT^{-1}$
BN	B_n	Breadth at waterline at n^{th} strip		L
VW	c_W	Wave velocity or celerity		LT^{-1}
FNORM	C	Cross force on body normal to lift and drag		LMT^{-2}
CFD	d	Coefficient of cross coupling terms in the equation of motion		ML
CMD	D	Coefficient of cross coupling terms in the equation of motion		ML
CFT	e	Coefficient of cross coupling terms in the equation of motion		MLT^{-1}
ETOT	E	Total energy per unit area of wave surface		MT^{-2}
CME	E	Coefficient of cross coupling terms in the equation of motion		MLT^{-1}
EKIN	E_K	Kinetic energy per unit area of wave surface		MT^{-2}
EPOT	E_P	Potential energy per unit area of wave surface		MT^{-2}
FR	f	Frequency	$1/T$	T^{-1}
FRE	f_E	Frequency of encounter	$1/T_E$	T^{-1}
DPTH	h	Depth of water		L
CFH	h	Coefficient of cross coupling terms in the equation of motion		LMT^{-2}
H	H	Wave height from crest to trough from observations		L
CMH	H	Coefficient of cross coupling terms in the equation of motion		LMT^{-2}
JXX JYY JZZ	J_x J_y J_z	Ship's mass moments of inertia about respective axes through G not accounting for added mass		$L^2 M$

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
JXY JXZ JYZ	J_{xy} J_{xz} J_{yz}	Ship's mass products of inertia		$L^2 M$
RDGX RDGY RDGZ	k_{xx} k_{yy} k_{zz}	Ship's mass radii of gyration		L
K2	k_2	Coefficient of accession to inertia (added mass) for submerged body, per unit body length		$L^{-1} M$
K4	k_4	Coefficient accounting for surface effects on accession to inertia (added mass), per unit body length		
MX MY MZ	K, M, N	Moment components on body relative to body axes		$L^2 MT^{-2}$
LW	L_W, λ	Wavelength from crest to crest		L
SMN	m_n	Spectrum moment (where n is an integer)		—
MBH	M_{BH}	Horizontal or lateral wave bending moment		$L^2 MT^{-2}$
MS	M_S	Moment of ship stability in general	$\Delta \overline{GZ}$ (Other moments such as those of capsizing, heeling, etc. will be represented by M_S with additional subscripts as appropriate)	$L^2 MT^{-2}$
MT	M_T	Torsional wave moment		$L^2 MT^{-2}$
MBV	M_{BV}	Vertical wave bending moment		$L^2 MT^{-2}$
NAW	n_{AW}	Increase in mean rate of revolution in waves		$REVS \cdot T^{-1}$
O	O	Origin of body axes		—
OMGX OMGY OMGZ	p, q, r	Components of angular velocity relative to body axes		T^{-1}
PAW	P_{AW}	Mean power increase in waves		$L^2 MT^{-3}$
PROB	p	Probability		—
PRESS	P	Pressure		$L^{-1} MT^{-2}$
QAW	Q_{AW}	Mean torque increase in waves		$L^2 MT^{-2}$
QBH	Q_B	Torque, bow hydroplanes		$L^2 MT^{-2}$
QR	Q_R	Torque, rudder		$L^2 MT^{-2}$
QSH	Q_S	Torque, stern hydroplanes		$L^2 MT^{-2}$
RAD	r	Radius of wave particles motion		L
RAW	R_{AW}	Mean resistance increase in waves	Resistance in waves minus the resistance in still water	LMT^{-2}
SBOW	s	Relative vertical motion of bow with respect to the wave surface		L

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
S1ZET, S1TET, etc.	$S_\zeta(\omega)$, $S_\theta(\omega)$, etc.	One-dimensional spectral density		1)
S2ZET, S2TET, etc.	$S_\zeta(\omega,\mu)$, $S_\theta(\omega,\mu)$, etc.	Two-dimensional spectral density		1)
TOW	T	Wave period		T
TAW	T_{AW}	Mean thrust increase in waves		LMT^{-2}
TCE	T_E	Period of encounter		T
TCZ	T_z	Natural period (in smooth water) for heaving		T
TCTET	T_θ	Natural period (in smooth water) for pitching		T
TCPHI	T_ϕ	Natural period (in smooth water) for rolling		T
TCAP	$\tilde{T}$	Apparent wave period (according to zero crossings)	The time elapsing between the occurrence of two successive upward crossings of zero	T
PERV	T_V	Visual period from observations		T
VS	v, V	Speed of ship		LT^{-1}
WREL	W_r	Relative vertical velocity ship to surface		LT^{-1}
FX, FY, FZ	X, Y, Z	Force components on body relative to body axes		LMT^{-2}
RAO	Y (subscript)	Response amplitude operator, referring to subscripted quantities	$\sqrt{\dfrac{S_{\text{subscript}_1}(\omega)}{S_{\text{subscript}_2}(\omega)}}$	1)
Z	z	Heaving motion, vertical displacement		L
ZAMPL	a_A	Heaving amplitude		L
ZREL	z_R	Relative vertical displacement, ship to surface		L
YTETZ	$Y_{\theta\zeta}(\omega)$	Frequency response function — pitch	$\sqrt{S_\theta(\omega)/S_\zeta(\omega)}$	1)
YPHIZ	$Y_{\phi\zeta}(\omega)$	Frequency response function — roll	$\sqrt{S_\phi(\omega)/S_\zeta(\omega)}$	1)
YPSIZ	$Y_{\psi\zeta}(\omega)$	Frequency response function — yaw	$\sqrt{S_\psi(\omega)/S_\zeta(\omega)}$	1)
ALFA	α	Angle of attack	The angle to the longitudinal body axis from the projection into the principal plane of symmetry of the origin of the body axes relative to the fluid, positive in the positive sense of rotation about the y-axis	—
BET	β	Angle of drift or side-slip	The angle to the principal plane of symmetry from the velocity vector of the origin of the body axes relative to the fluid, positive in the positive sense of rotation about the z-axis	—

1) Dimensions depend on particular application.

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
BETM	$\overline{\beta}$	Mean drift angle		—
GAMR	γ	Projected angle of roll or heel	The angular displacement about the x_0-axis of the principal plane of symmetry from the vertical, positive in the positive sense of rotation about the x_0-axis	—
DLTBH	δ_B	Bow hydroplane angle		—
DLTR	δ_R	Rudder angle, actual		—
DLTRO	δ_{RO}	Rudder angle, ordered		—
DLTSH	δ_S	Stern hydroplane angle		—
EPS	ε (epsilon)	Phase angle between the motions and the waves		—
ZET	ζ (zeta)	Instantaneous wave elevation		L
ZETA	ζ_A	Wave amplitude		L
ZETW	ζ_W	Height of a wave	Height of a wave from trough to crest	L
ZETAA	$\tilde{\zeta}_A$	Apparent wave amplitude		L
ZETWA	$\tilde{\zeta}_W$	Apparent wave height	The vertical distance between a successive crest and trough	L
TETP	θ (ψ)	Pitch angle		—
TETPA	θ_A (ψ_A)	Pitch amplitude		—
TETPM	$\overline{\theta}$ ($\overline{\psi}$)	Mean pitch angle		—
CAPW	κ, (k)	Wave number	$2\pi/\mu$	L^{-1}
LW	λ, L_W	Wave length		L
LWA	λ	Apparent wavelength (according to zero crossing)	The horizontal distance between two successive upward crossings of zero	L
TFH	Λ_z (capital lambda)	Tuning factor for heaving	T_z/T_E	—
TFP	Λ_θ	Tuning factor for pitching	T_θ/T_E	—
TFR	Λ_ϕ	Tuning factor for rolling	T_ϕ/T_E	—
MUW	μ	Wave direction angle	Component wave direction angle relative to x_0-axis	—
MUCOM	μ_W	Angle between wave-component direction and ship's course		—
DEV	σ (sigma)	Standard deviation from mean		1)
VAR	σ^2	Variance	$= m_0$	1)
PHIR	ϕ	Roll angle		—
PHIRA	ϕ_A	Roll amplitude		—
PHIRM	$\overline{\phi}$	Mean roll angle		—
PHI	ϕ	a) Velocity potential b) Angle of roll		L^2T^{-1} —

1) Dimensions depend on particular application.

R.C.S. symbol	Usual symbol	Title	Explanation	Dimensions
PSIH	ψ	Heading angle		—
PSI0	ψ_0	Course		—
PSIY	ψ [χ (chi)]	Yaw angle		—
PSIYA	ψ_A (χ_A)	Yaw oscillation amplitude		—
PSIYM	$\bar{\psi}$ ($\bar{\chi}$)	Mean yaw		—
OMG	ω	Circular frequency	$2\pi/T$	T^{-1}
OMGC	ω_C	Steady rate of turn		T^{-1}
OMGE	ω_E	Frequency of encounter	$2\pi/T_E$	T^{-1}
OMGH	ω_z	Natural (circular) frequency for heaving	$2\pi/T_z$	T^{-1}
OMGP	ω_θ	Natural (circular) frequency for pitching	$2\pi/T_\theta$	T^{-1}
OMGR	ω_ϕ	Natural (circular) frequency for rolling	$2\pi/T_\phi$	T^{-1}