INTERNATIONAL
TOWING TANK
CONFERENCE

ITTC Symbols and Terminology List

Alphabetic

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ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
A	MS	(*fundamental, statistical, stochastic*) Average, sample mean		
A	AP	*(fluid mechanics, lifting surfaces)* Projected area	$b\ c_M$	m^2
A	A, AR, AREA	*(ships, basic quantities)* Area in general		m^2
A		*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Assumed centre of gravity above keel used for cross curves of stability		*1*
A_O	AO	*(ships, propulsor performance, propulsor geometry)* Propeller disc area	$\pi D^2 / 4$	m^2
A_n, A_6		*(ships, propulsor geometry, water jets)* Nozzle discharge area		m^2
$\overline{AB}$	XAB	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal centre of buoyancy from aft perpendicular	Distance of centre of buoyancy from aft perpendicular	m
A_{BL}	ABL	*(ships, hull geometry)* Area of bulbous bow in longitudinal plane	The area of the ram projected on the middle line plane forward of the fore perpendicular	m^2
A_{BT}	ABT	*(ships, hull geometry)* Area of transverse cross-section of a bulbous bow (full area port and star-board)	The cross sectional area at the fore perpendicular. Where the water lines are rounded so as to terminate on the forward perpendicular A_{BT} is measured by continuing the area curve forward to the perpendicular, ignoring the final rounding;	m^2
A_C	AC	*(ships, appendage geometry)* Area under cut-up		m^2
A_C	CUA	*(ACV and SES)* Cushion area	Projected area of ACV or SES cushion on water surface	m^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
A_C		*(seakeeping, large amplitude motions capsizing)* Area of deck available to crew		m²
A_D	AD	*(ships, propulsor geometry)* Developed blade area	D eveloped blade area of a screw propeller outside the boss or hub	m^2
A_{DEN}	ADEN	*(ships, propulsor geometry)* Duct entry area		m^2
A_{DEX}	ADEX	*(ships, propulsor geometry)* Duct exit area		m^2
A_E	AE	*(ships, propulsor geometry)* Expanded blade area	Expanded blade area of a screw propeller outside the boss or hub	m^2
$\overline{AF}$	XAF	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Distance of the centre of flotation from aft perpendicular		m
A_F	AFO	*(hydrofoil boats)* Foil area (general)	Foil area in horizontal plane	m^2
A_{FB}	AFB, AFB0	*(ships, appendage geometry, ships, manoeuvrability)* Projected area of bow fins		m^2
A_{FE}	AFE	*(hydrofoil boats)* Emerged area of foil		m^2
A_{FF}	ASFF	*(hydrofoil boats)* Submerged area of front foil		m^2
A_{FR}	AFR	*(ships, appendage geometry)* Frontal area	Projected frontal area of an appendage	m^2
A_{FS}	AFS, AFST	*(ships, appendage geometry, seakeeping)* Projected area of stern fins		m^2
A_{FS}	AFS	*(hydrofoil boats)* Submerged foil area		m^2
A_{FST0}	AFSTO	*(hydrofoil boats)* Submerged foil plan area at take-off speed		m^2
A_{FT}	AFT	*(hydrofoil boats)* Total foil plan area		m^2
$\overline{AG}_L$	XAG	*(seakeeping, large amplitude motions capsizing)* Longitudinal centre of gravity from aft perpendicular	Distance of centre of gravity from aft perpendicular	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$\overline{AG}_{\mathrm{T}}$	YAG	*(seakeeping, large amplitude motions capsizing)* Transverse distance from assumed centre of gravity A, to actual centre of gravity G		m
$\overline{AG}_{\mathrm{V}}$	ZAG	*(seakeeping, large amplitude motions capsizing)* Vertical distance from assumed centre of gravity A, to actual centre of gravity G		m
A_{HL}	AHLT	*(ships, manoeuvrability)* Lateral area of the hull	The area of the profile of the underwater hull of a ship when projected normally upon the longitudinal centre plane	m^2
A_{I}	AIA	*(multi-hull vessels)* Strut-hull intersection area		m^2
A_{ij}	AM(I,J)	*(solid body mechanics, inertial and hydro properties)* Added mass coefficient in i^{th} mode due to j^{th} motion		1
A_{J}	ASJ	*(sailing vessels)* Area of jib or genoa		m^2
A_{LK}	ALK	*(sailing vessels)* Lateral area of keel		m^2
A_{LT}	ALT	*(sailing vessels)* Total lateral area of yacht		m^2
A_{LV}	AHLV	*(ships, manoeuvrability, seakeeping, large amplitude motions capsizing))* Lateral area of hull above water		m^2
A_{M}	AM	*(ships, hull geometry)* Area of midship section	Midway between fore and aft perpendiculars	m^2
A_{m}	ASM	*(sailing vessels)* Area of mainsail		m^2
A_{N}	ASN	*(sailing vessels)* Normalized sail area		m^2
A_n		*(ships, propulsor geometry, water jets)*Nozzle discharge area		m^2
A_{P}	AP	*(ships, propulsor geometry)* Projected blade area	Projected blade area of a screw propeller outside the boss or hub	m^2
A_{PB}	APB	Wetted Surface Area of Pod Main Body		m^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
A_{PBF}	APBF	Wetted Surface Area of Bottom Fin		m^2
A_{PS}	APS	Wetted Surface Area of Strut		m^2
A_R	ARU	*(ships, manoeuvrability)* Total lateral area of rudder		m^2
A_{RF}	AF	*(ships, appendage geometry)* Lateral area of rudder flap		m^2
A_{RL}		*(seakeeping, large amplitude motions capsizing)* Positive area under righting lever curve		m^2
A_{Rmov}	ARMV	*(ships, manoeuvrability)* Lateral area of the movable part of rudder		m^2
A_{RN}	ARNO	*(ships, manoeuvrability)* Nominal lateral area of rudder	$(A_R + A_{Rmov}) / 2$	m^2
A_{RP}	ARP	*(ships, appendage geometry)*Lateral area of rudder in the propeller race		m^2
A_{RT}	ART	*(ships, appendage geometry)* Total lateral area of rudder	$A_{RX} + A_{Rmov}$	m^2
A_{RX}	ARX	*(ships, appendage geometry)* Lateral area of the fixed part of rudder		m^2
A_S	AS	*(seakeeping, large amplitude motions capsizing, sailing vessels)* Sail area in general, Area of sails in profile according to ISO 8666	$(P\,E + I\,J) / 2$	m^2
A_s		*(ships, propulsor geometry, water jets)* Cross sectional area at station *s*		m^2
A_{SFR}	ASFR	*(hydrofoil boats)* Submerged area of rear foil		m^2
A_{SI}	ASI	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Attained subdivision index		1
A_{SK}	ASK	*(ships, appendage geometry)* Projected skeg area		m^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
A_{SP}	ASSP	*(sailing vessels)* Area of spinnaker		m^2
A_{SS}	ASS	*(hydrofoil boats)* Submerged strut area		m^2
A_T	ATR	*(ships, hull geometry)* Area of transom (full area port and starboard)	Cross-sectional area of transom stern below the load waterline	m^2
A_V	AV	*(ships, hull geometry seakeeping, large amplitude motions capsizing)* Projected lateral area of the portion of the ship and deck cargo above the waterline – (IMO/IS, IMO/HSC'2000*)* Area exposed to wind	Area of portion of ship above waterline projected normally to the direction of relative wind	m^2
A_W	AW	*(ships, hull geometry)* Area of water-plane		m^2
A_{WA}	AWA	*(ships, hull geometry)* Area of water-plane aft of midship		m_2
A_{WF}	AWF	*(ships, hull geometry)* Area of water-plane forward of midship		m^2
A_X	AX	*(ships, hull geometry)* Area of maximum transverse section		m^2
$\overline{AZ}$	YAZ	*(seakeeping, large amplitude motions, capsizing ships, hydrostatics, stability)* Righting arm based on horizontal distance from assumed centre of gravity A, to Z	Generally tabulated in cross curves of stability	m
$A_{z\zeta}(\omega)$		*(ships, seakeeping)* Amplitude of frequency response function for translatory motions	$z_a(\omega)$ / $\zeta_a(\omega)$ or $z_a(\omega)$ / $\eta_a(\omega)$	1
$A_{\theta\zeta}(\omega)$		*(ships, seakeeping)* Amplitude of frequency response function for rotary motions	$\Theta_a(\omega)$ / $\zeta_a(\omega)$ or $\Theta_a(\omega)$ / $(\omega^2/ (g\zeta_a(\omega)))$	1
a, a^1	AC, A1	*(ships, basic quantities)* Linear or translatory acceleration	dv / dt	m/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
a	ADMP	(*fundamental, time and frequency domain quantity*) Damping	s^r, in Laplace variable	1/s
a	RAUG	*(ships, performance)* Resistance augment fraction	$(T - R_T) / R_T$	1
a	ATT	*(ships, unsteady propeller forces)* Cylindrical coordinates	Cylindrical system with origin O and longitudinal x-axis as defined before; angular a-(attitude)-coordinate , zero at 12 o'clock position, positive clockwise looking forward, r distance measured from the x-axis	
a		Half-width of a rectangular distribution	Half-width of a rectangular distribution of possible values of input quantity X_i: $a = (a_+ - a_-) / 2$	
a_D	ADR	*(ships, propulsor geometry)* Developed blade area ratio	A_D / A_0	1
a_E	ADE	*(ships, propulsor geometry)* Expanded blade area ratio	A_E / A_0	1
a_i	AT(I)	*(ships, seakeeping)* Attitudes of the floating system	i = 1, 2, 3, e.g. Euler angles of roll, pitch, and yaw, respectively	rad
a_P	ADP	*(ships, propulsor geometry)* Projected blade area ratio	A_P / A_0	1
a_+		Upper bound	Upper bound, or upper limit, of input quantity X_i:	
a_-		Lower bound	Lower bound, or lower limit, of input quantity X_i:	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
B	B, BR	*(ships, basic quantities, hull geometry)* Breadth, Beam or breadth, moulded, of ships hull		m
B		*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Centre of buoyancy	Centroid of the underwater volume	
B_{B}	BB	*(multi-hull vessels)* Box beam	Beam of main deck	m
B_{C}	BCU	*(ACV and SES)* Cushion beam	SES cushion beam measured between the side walls	m
B^{C}	CIRCB	*(ships, hull geometry)* R.E. Froude's breadth coefficient	$B / \nabla^{1/3}$	1
B_{CB}		*(seakeeping, large amplitude motions capsizing)* Beam between centres of buoyancy of side hulls		m
B_{FOA}	BFOA	*(hydrofoil boats)* Maximum vessel breadth including foils		m
B_{ij}	DA(I,J)	*(solid body mechanics, inertial and hydro properties)* Damping coefficient in *i*th mode due to *j*th motion		
B_{LCG}	BLCG	*(planing, semi-displacement vessels)* Beam at longitudinal position of the centre of gravity	Breadth over spray strips measured at transverse section containing centre of gravity	m
B_{M}	BM	*(ships, hull geometry)* Breadth, moulded of midship section at design water line		m
$\overline{BM}$	ZBM	*(seakeeping, large amplitude motions capsizing)* Transverse metacentre above centre of buoyancy	Distance from the centre of buoyancy B to transverse metacentre M $\overline{BM} = \frac{I_{\mathrm{T}}}{\nabla} = \overline{KM} - \overline{KB}$	m
$\overline{BM}_L$	ZBML	*(seakeeping, large amplitude motions capsizing)* Longitudinal metacentre above centre of buoyancy	$\overline{BM}_L = \overline{KM}_L - \overline{KB}$	m
Bo	BN	*(fluid mechanics, flow parameter)* Boussinesq number	$V / (g R_{\mathrm{H}})^{1/2}$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
B_{OA}	BOA	*(sailing vessels)* Beam, overall		m
B_{P}	BP	*(ships, propulsor performance)* Taylor's propeller coefficient based on delivered horsepower (obsolete)	$n P_{\mathrm{D}}^{½} / V_{\mathrm{A}}^{2.5}$ with n in revs/min, P_{D} in horsepower, and V_{A} in kn	1
B_{PA}	BPA	*(planing, semi-displacement vessels)* Mean breadth over chines	$A_{\mathrm{P}} / L_{\mathrm{P}}$	m
B_{PC}	BPC	*(planing, semi-displacement vessels)* Beam over chines	Beam over chines, excluding external spray strips	m
B_{PT}	BPT	*(planing, semi-displacement vessels)* Transom breadth	Breadth over chines at transom, excluding external spray strips	m
B_{PX}	BPX	*(planing, semi-displacement vessels)* Maximum breadth over chines	Maximum breadth over chines, excluding external spray strips	m
B_{S}	BS	*(multi-hull vessels)* Hull spacing	Distance between hull centre lines	m
B_{T}	BTR	*(ships, hull geometry)* Breadth, moulded of transom at design water line		m
B_{TV}	BTUN	*(multi-hull vessels)* Tunnel width	Minimal distance of the demihulls at the waterline	m
B_{U}	BU	*(ships, propulsor performance)* Taylor's propeller coefficient based on thrust horsepower (obsolete)	$n P_{\mathrm{T}}^{½} / V_{\mathrm{A}}^{2.5}$ with n in revs/min, P_{T} in horsepower, and V_{A} in kn	1
B_{WL}	BWL	*(ships, hull geometry)* Maximum moulded breadth at design water line		m
B_{WLT}	BWLT	*(ACV and SES)* Total waterline breadth of SES	At the water line	m
B_{X}	BX	*(ships, hull geometry)* Breadth, moulded of maximum section area at design water line		m
$\overline{BM}$	ZBM	*(ships, hydrostatics, stability)* Transverse metacentre above centre of buoyancy	Distance from the centre of buoyancy B to the transverse metacentre M. $\overline{BM} = I_{\mathrm{T}} / \nabla = \overline{KM} - \overline{KB}$	m
$\overline{BM_{\mathrm{L}}}$	ZBML	*(ships, hydrostatics, stability)* Longitudinal metacentre above centre of buoyancy	$\overline{\mathrm{KM}_{\mathrm{L}}} - \overline{KB}$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
b		*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Centre of flotation of added buoyancy layer or centre of lost buoyancy of the flooded volume		
b		*(seakeeping, large amplitude motions capsizing)* Maximum tank breadth		m
b	B	*(environmental mechanics, waves)* Bandwidth of spectral resolution	Sampling frequency divided by the number of transform points	Hz
b	SP	*(fluid mechanics, lifting surfaces)* Wing or foil span		m
b_{F}	BSPF	*(fluid mechanics, lifting surfaces)* Flap span		m
b_{R}	SPRU	*(ships, manoeuvrability)* Rudder span	Maximum distance from root to tip	m
b_{RM}	SPRUME	*(ships, manoeuvrability)* Mean span of rudder		m
b_{S}	BST	*(hydrofoil boats)* Span of struts		m
b_{ST}	BSTT	*(hydrofoil boats)* Transverse horizontal distance of struts		m
b_{w}	BSPW	*(hydrofoil boats)* Foil span wetted		m
b_{+}		Upper bound of the deviation	Upper bound, or upper limit, of the deviation of input quantity X_i from its estimate x_i: $b_{+} = a_{+} - x_i$	
b_{-}		Lower bound of the deviation	Lower bound, or lower limit, of the deviation of input quantity X_i from its estimate x_i: $b_{\_} = x_i - a_{\_}$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
C	CR	(*fundamental, statistical, stochastic*) Population covariance		
C	FF(2)	*(ships, basic quantities)* Cross force	Force normal to lift and drag (forces)	N
C_{10}	C10M	*(environmental mechanics, wind)* Surface drag coefficient	$(0.08 + 0.065U_{10})10^{-3}$	
C_{A}	CA	*(ships, hull resistance)* Incremental resistance coefficient for model ship correlation	$R_{\mathrm{A}} / (S\ q)$	1
C_{AA}	CAA	*(ships, hull resistance)* Air or wind resistance coefficient	$R_{\mathrm{AA}} / (S\ q)$ $= C_{DA} \dfrac{\rho_{\mathrm{A}}}{\rho_{\mathrm{S}}} \dfrac{A_{\mathrm{V}}}{S_{\mathrm{S}}} = -C_{\mathrm{X}} \dfrac{\rho_{\mathrm{A}}}{\rho_{\mathrm{S}}} \dfrac{A_{\mathrm{V}}}{S_{\mathrm{S}}}$	1
C_{ADM}	CADM	*(ships, performance)* Admiralty coefficient	$\Delta^{2/3}\ V^3 / P_{\mathrm{S}}$	1
C_{AL}	CAHL	*(ships, manoeuvrability)* Coefficient of lateral area of ship	$A_{\mathrm{HL}} / (L\ T)$	1
C_{APP}	CAPP	*(ships, hull resistance)* Appendage resistance coefficient	$R_{\mathrm{APP}} / (S\ q)$	1
C_{B}	CB	*(ships, hull geometry)* Block coefficient	$\nabla / (L\ B\ T)$	1
C_{BFTC}	CBFTC	Thickness Cord Ratio of Bottom Fin		1
Cc	CC	*(ships, basic quantities)* Cross force coefficient	$C_{\mathrm{C}} = \dfrac{C}{qA}$	1
C^{C}	CIRCC	*(ships, hull resistance)* R.E. Froude's resistance coefficient	$1000\ R_{\mathrm{T}} / (\Delta(K^{\mathrm{C}})^2)$	1
C_D	CDSE	*(fluid mechanics, lifting surfaces)* Section drag coefficient		1
C_D	CD	*(ships, hull resistance)* Drag coefficient	$D / (S\ q)$	1
C_{D}		*(seakeeping, large amplitude motions capsizing)* Crew density	Proportion of boat plan needed for crew	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
C_{DA}	CDA	*(ships, Resistance and Propulsion, Hull resistance)* *Fujiwara* air or wind resistance coefficient, from wind tunnel tests	$R_{AA} / (A_V\, q_R)$	1
C_{DF}	CDF	*(hydrofoil boats)* Drag coefficient of foil	$D_F / (A_{FS}\, q)$	1
C_{DI}	CDSI	*(fluid mechanics, lifting surfaces)* Section induced drag coefficient		1
C_{DI}	CDI	*(hydrofoil boats)* Induced drag coefficient	$D_I / (A_{FS}\, q)$	1
C_{DINT}	CDINT	*(hydrofoil boats)* Interference drag coefficient	$D_{INT} / (A_{FS}\, q)$	1
C_{D0}	CD0	*(hydrofoil boats)* Section drag coefficient for angle of attack equal to zero	$D_P / (A_{FS}\, q)$	1
C_{DS}	CDSP	*(hydrofoil boats)* Spray drag coefficient	$D_S / (A_{FS}\, q)$	1
C_{DVENT}	CDVENT	*(hydrofoil boats)* Ventilation drag coefficient	$D_V / (A_{FS}\, q)$	1
C_{DW}	CDW	*(hydrofoil boats)* Wave drag coefficient	$D_W / (A_{FS}\, q)$	1
$C_{D\nabla}$	CDVOL	*(ships, performance)* Power-displacement coefficient	$P_D / (\rho\, V^3\, \nabla^{2/3} / 2)$	1
C_F	CF	*(ships, hull resistance)* Frictional resistance coefficient of a body	$R_F / (S\, q)$	1
C_f	CFL	*(fluid mechanics, boundary layers)* Skin friction coefficient	$\tau / (\rho\, U_e^2 / 2)$	1
C_{F0}	CF0	*(ships, hull resistance)* Frictional resistance coefficient of a corresponding plate	$R_{F0} / (S\, q)$	1
C_{FU}	CFU	*(sailing vessels)* Frictional resistance coefficient (upright)	$R_{FU} / (S\, q)$	1
C_{GM}	CGM	*(ships, Geometry and Hydrostatics, Hull Geometry)* Dimensionless $\overline{GM}$ coefficient	$\overline{GM} / \nabla^{1/3}$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
C_{GZ}	CGZ	*(ships, Geometry and Hydrostatics, Hull Geometry)*Dimensionless $\overline{GZ}$ coefficient	$\overline{GZ} / \nabla^{1/3}$	1
C_{KG}	CKG	*(ships, Geometry and Hydrostatics, Hull Geometry)*Dimensionless $\overline{KG}$ coefficient	$\overline{KG} / T$	1
C_{H}		*(seakeeping, large amplitude motions capsizing)* Height coefficient, depending on the height above sea level of the structural member exposed to the wind		1
C_{I}		*(sailing vessels)* Induced resistance coefficient		1
C_{I}	CI	*(ice going vessels)* Coefficient of net ice resistance	$R_{I} / (\rho_{I}\, g\, h^2\, B)$	1
C_{ij}	RF(I,J)	*(solid body mechanics, inertial and hydro properties)* Restoring force coefficient in i^{th} mode due to j^{th} motion		
C_{IL}	CWIL	*(ships, hull geometry)* Coefficient of inertia of water plane, longitudinal	$12\, I_{L} / (B\, L^3)$	1
C_{IT}	CWIT	*(ships, hull geometry)* Coefficient of inertia of water plane, transverse	$12\, I_{T} / (B^3\, L)$	1
C_{IW}	CIW	*(ice going vessels)* Coefficient of water resistance in the presence of ice	$R_{IW} / (S\, q_{IW})$	1
C_{L}		*(seakeeping, large amplitude motions capsizing)* Crew limit	Maximum number of persons on board	
C_{L}	CLSE	*(fluid mechanics, lifting surfaces)* Section lift coefficient		1
C_{LF}	CLF	*(hydrofoil boats)* Foil lift coefficient	$L_{F} / (A_{FS}\, q)$	1
C_{L0}	CL0	*(hydrofoil boats)* Profile lift coefficient for angle of attack equal to zero	$L_{0} / (A_{FS}\, q)$	1
C_{L0}	CL0D	*(planing, semi-displacement vessels)* Lift coefficient for zero deadrise	$\Delta / (B_{CG}^2\, q)$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$C_{L\mathrm{TO}}$	CLTO	*(hydrofoil boats)* Lift coefficient at take-off condition	$L_{\mathrm{TO}} / (A_{\mathrm{FS}}\ q)$	1
$C_{L\mathrm{X}}$	CLA	*(hydrofoil boats)* Slope of lift curve	$dC_L / d\alpha$	1
$C_{L\beta}$	CLBET	*(planing, semi-displacement vessels)* Lift coefficient for dead rise surface	$\Delta / (B_{\mathrm{CG}}^2\ q)$	1
C_{M}	CMSE	*(fluid mechanics, lifting surfaces)* Section moment coefficient		1
C_{M}	CMS	*(ships, hull geometry)* Midship section coefficient (midway between forward and aft perpendiculars)	$A_{\mathrm{M}} / (B\ T)$	1
C_M	CM	*(hydrofoil boats)* Pitching moment coefficient	$M / ((A_{\mathrm{FF}} + A_{\mathrm{FR}})\ (l_{\mathrm{F}} - l_{\mathrm{R}})\ q)$	1
C_{MTL}	CMTL	Longitudinal trimming coefficient	Trimming moment divided by change in trim which approximately equals $\overline{BM}_L / L$	1
C_N	CN	*(ships, performance)* Trial correction for propeller rate of revolution at speed identity	$n_{\mathrm{T}} / n_{\mathrm{S}}$	1
C_{NP}	CNP	*(ships, performance)* Trial correction for propeller rate of revolution at power identity	$P_{\mathrm{DT}} / P_{\mathrm{DS}}$	1
C_{P}	CPL	*(ships, hull geometry)* Longitudinal prismatic coefficient	$\nabla / (A_{\mathrm{X}}\ L)$ or $\nabla / (A_{\mathrm{M}}\ L)$	1
C_P	CDP	*(ships, performance)* Trial correction for delivered power		1
C_P	CPD	*(ships, propulsor performance)* Power loading coefficient	$P_{\mathrm{D}} / (A_{\mathrm{P}}\ q_{\mathrm{A}}\ V_{\mathrm{A}})$	1
C_p	CP	*(ships, hull resistance, water jets)* Local pressure coefficient	$(p-p_0)/(\rho\ V^2/2)$	1
C_{PA}	CPA	*(ships, hull geometry)* Prismatic coefficient, after body	$\nabla_{\mathrm{A}} / (A_{\mathrm{X}}\ L / 2)$ or $\nabla_{\mathrm{A}} / (A_{\mathrm{M}}\ L / 2)$	1
C_{PE}	CPE	*(ships, hull geometry)* Prismatic coefficient, entrance	$\nabla_{\mathrm{E}} / (A_{\mathrm{X}}\ L_{\mathrm{E}})$ or $\nabla_{\mathrm{E}} / (A_{\mathrm{M}}\ L_{\mathrm{E}})$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
C_{PF}	CPF	*(ships, hull geometry)* Prismatic coefficient fore body	$\nabla_{\mathrm{F}} / (A_{\mathrm{X}}\, L / 2)$ or $\nabla_{\mathrm{F}} / (A_{\mathrm{M}}\, L / 2)$	1
C_{pi}	CPI	*(sailing vessels)* Center of pressure for A_i		1
C_{PR}	CPR	*(ships, hull resistance)* Pressure resistance coefficient, including wave effect	$R_P / (S\, q)$	1
C_{PR}	CPR	*(ships, hull geometry)* Prismatic coefficient, run	$\nabla_{\mathrm{R}} / (A_{\mathrm{X}}\, L_{\mathrm{R}})$ *or* $\nabla_{\mathrm{R}} / (A_{\mathrm{M}}\, L_{\mathrm{R}})$	1
C_{PR}	CPR	*(ACV and SES)* Aerodynamic profile drag coefficient	$R_0 / (\rho_{\mathrm{A}}\, V_{\mathrm{R}}^2\, A_{\mathrm{C}} / 2)$	1
$C_{P\mathrm{V}}$	CPV	*(ships, hull resistance)* Viscous pressure resistance coefficient	$R_{P\mathrm{V}} / (S\, q)$	1
C_{Q*}	CQS	*(ships, propulsor performance)* Torque index	$Q / (A_{\mathrm{P}}\, q_{\mathrm{S}}\, D)$	1
CR	CR	(*fundamental, statistical, stochastic*) Population covariance		
C_{R}	CR	*(ships, hull resistance)* Residuary resistance coefficient	$R_{\mathrm{R}} / (S\, q)$	1
C_{r}	CRA	*(environmental mechanics, waves)* Average reflection coefficient		1
C_{r}	CRDS	*(ships, manoeuvrability, seakeeping)* Directional stability criterion	$Y_v\, (N_{\mathrm{r}} - mux_G) - N_v\, (Y_{\mathrm{r}} - mu)$	$\mathrm{N^2s^2}$
$C_{\mathrm{r}}(f)$	CRF	*(environmental mechanics, waves)* Reflection coefficient amplitude function		1
C_{RU}	CRU	*(sailing vessels)* Residuary resistance coefficient (upright)	$R_{\mathrm{RU}} / (S\, q)$	1
CS	CS	(*fundamental, statistical, stochastic*) Sample covariance		
C_{S}	CSR	*(ships, hull resistance)* Spray resistance coefficient	$R_{\mathrm{S}} / (S\, q)$	1
C_S	CS	*(ships, hull geometry)* Wetted surface coefficient	$S / (\nabla L)^{1/2}$	1
C_{s}		*(seakeeping, large amplitude motions capsizing)* Shape coefficient, depending on the shape of the structural member exposed to the wind		1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
C_{STC}	CSTC	Thickness Cord Ratio of Strut		1
C_T	CT	*(ships, hull resistance)* Total resistance coefficient	$R_T / (S\ q)$	1
C_{T*}	CTHS	*(ships, propulsor performance)* Thrust index	$T / (A_P\ q_S)$	1
C_{Th}	CTH	*(ships, propulsor performance)* Thrust loading coefficient, energy loading coefficient	$T / (A_P\ q_A) = (T_P / A_P) / q_A$	1
C_{TL}	CTLT	*(ships, hull resistance)* Telfer's resistance coefficient	$g\ R\ L / (\Delta V^2)$	1
C_{Tn}		*(ships, hull resistance, water jets)* Thrust loading coefficient:	$\dfrac{T_{net}}{\frac{1}{2}\rho U_0^2 A_n}$	1
C_{TQ}	CTQ	*(ships, hull resistance)* Qualified resistance coefficient	$C_{T\nabla} / (\eta_H\ \eta_R)$	1
C_{TU}	CTU	*(sailing vessels)* Total resistance coefficient (upright)	$R_{TU} / (S\ q)$	1
$C_{T\nabla}$	CTVOL	*(ships, hull resistance)* Resistance displacement	$R_T / (\nabla^{2/3}\ q)$	1
$C_{T\varphi}$	CTPHI	*(sailing vessels)* Total resistance coefficient with heel and leeway	$R_{T\varphi} / (S\ q)$	1
C_{uv}	SI(U,V)	*(ships, unsteady propeller forces)* Generalized stiffness		
C_V	CV	*(ships, hull resistance)* Total viscous resistance coefficient	$R_V / (S\ q)$	1
C_V	CSP	*(planing, semi-displacement vessels)* Froude number based on breadth	$V / (B_{CG}\ g)^{1/2}$	1
C_{VP}	CVP	*(ships, hull geometry)* Prismatic coefficient vertical	$\nabla / (A_W\ T)$	1
C_W	CW	*(ships, hull resistance)* Wave making resistance coefficient	$R_W / (S\ q)$	1
C_{WA}	CWA	*(ships, hull geometry)* Water plane area coefficient, aft	$A_{WA} / (B\ L / 2)$	1
C_{WC}	CWC	*(ACV and SES)* Cushion wave making coefficient		1
C_{WF}	CWF	*(ships, hull geometry)* Water plane area coefficient, forward	$A_{WF} / (B\ L / 2)$	1
C_{WP}	CW	*(ships, hull geometry)* Water plane area coefficient	$A_{WP} / (L\ B)$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
C_{WP}	CWP	*(ships, hull resistance)* Wave pattern resistance coefficient, by wave analysis		1
C_{WU}	CWU	*(sailing vessels)* Wave resistance coefficient (upright)		1
C_{X}	CX	*(ships, hull geometry)* Maximum transverse section coefficient	$A_{\mathrm{X}} / (B\ T)$,where B and T are measured at the position of maximum area	1
C_{X}	CXA	*(ships, hull resistance)* Air or wind resistance coefficient, usually from wind tunnel tests	$-R_{\mathrm{AA}} / (A_{\mathrm{V}}\ q_{\mathrm{R}})$	1
C_x		*(sailing vessels)* Force coefficients		1
C_{xx}	*XX*CR	(*fundamental, statistical, stochastic*) Auto-covariance of a stationary stochastic process	$(x(t) - x^E)(x(t + \tau) - x^E)^E$	
C_{xy}	*XY*CR	(*fundamental, statistical, stochastic*) Cross-covariance of two stationary stochastic processes	$(x(t) - x^E)(y(t + \tau) - y^E)^E$	
C_y		*(sailing vessels)* Force coefficients		1
C_z		*(sailing vessels)* Force coefficients		1
C_{∇}	CVOL	*(ships, hull geometry)* Volumetric coefficient	∇ / L^3	1
C_{Δ}	CDL	*(planing, semi-displacement vessels)* Load coefficient	$\Delta / (B_{\mathrm{CG}}^3\ \rho\ g)$	1
C_{Δ}	CLOAD	*(ACV and SES)* Cushion loading coefficient	$\Delta / (g\ \rho_{\mathrm{A}}\ A_{\mathrm{C}}^{3/2})$	1
c	CS	*(fluid mechanics, flow parameter)* Velocity of sound	$(E / \rho)^{1/2}$	m/s
$c_{0.7}$	C07	*(ships, propulsor geometry, appendage geometry)* Chord length	Chord length at r/R=0.7	m
c	CH, LCH	*(ships, propulsor geometry, appendage geometry)* Chord length, chord length of a foil section		m
c_{C}	CHC	*(hydrofoil boats)* Chord length at centre plane		m
c_{F}	CFL	*(hydrofoil boats)* Chord length of flap		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
c_{es}		*(ships, hull resistance, water jets)* Energy velocity coefficient at station *s*		1
c_{FT}	CHTI	*(hydrofoil boats)* Chord length at foil tips		m
c_{G}	VG	*(environmental mechanics, waves)* Wave group velocity or celerity	The average :rate of advance of the energy in a finite train of gravity waves	m/s
c_i		*(uncertainty)* Sensitivity coefficient	$c_i = \partial f / \partial x_i$.	1
c_{LE}	CHLE	*(ships, geometry and hydrostatics, propulsor geometry)* Chord, leading part	The part of the Chord delimited by the Leading Edge and the intersection between the Generator Line and the pitch helix at the considered radius	m
c_{M}	CHM, CHME	*(ships, appendage geometry, propulsor geometry, fluid mechanics, lifting surfaces hydrofoil boats)* Mean chord length	The expanded or developed area of a propeller blade divided by the span from the hub to the tip, A_{RT} / S	m
c_{ms}		*(ships, hull resistance, water jets)* Momentum velocity coefficient at station *s*		1
c_{PF}	CPFL	*(hydrofoil boats)* Distance of centre of pressure on a foil or flap from leading edge		m
c_{R}	CHRT	*(fluid mechanics, lifting surfaces, ships, appendage geometry)* Chord length at the root		m
c_{S}	CS	*(ships, propulsor geometry)* Skew displacement	The displacement between middle of chord and the blade reference line. Positive when middle chord is at the trailing side regarding the blade reference line	m
c_{S}	CSTR	*(hydrofoil boats)* Chord length of a strut		m
c_{SF}	CHSF	*(hydrofoil boats)* Chord length of strut at intersection with foil		m
c_{T}	CHTP	*(ships, appendage geometry)* Chord length at the tip		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
c_{TE}	CHTE	Chord, trailing part	The part of the Chord delimited by the Trailing Edge and the intersection between the Generator Line and the pitch helix at the considered radius	m
c_{W}	VP	*(environmental mechanics, waves)* Wave phase velocity or celerity	$L_{\mathrm{W}}/T_{\mathrm{W}} = \sqrt{gL_{\mathrm{W}}/2\pi}$ in deep water	m/s
$c_{\mathrm{W}i}$	VP(I)	*(environmental mechanics, waves)* Wave phase velocity of harmonic components of a periodic wave	const = c_{W} for periodic waves in deep water	m/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
D	DR	(*fundamental, statistical, stochastic*) Population deviation		
D	DEP	*(ships, hull geometry)* Depth, moulded, of a ship hull		m
D	D, DI	*(ships, basic quantities)* Diameter		m
D	DP	*(ships, propulsor geometry, propulsor performance)* Propeller diameter		m
D	FF(1)	*(ships, basic quantities)* Drag (force)	Force opposing translatory velocity, generally for a completely immersed body	N
D		*(ships, propulsor geometry, water jets)* Impeller diameter (maximum)		m
D_0	DC0	*(ships, manoeuvrability, turning circles)* Inherent steady turning diameter $\delta_R = \delta_0$		m
D_0'	DC0N	*(ships, manoeuvrability, turning circles)* Non-dimensional inherent steady turning diameter	D_0 / L_{PP}	1
D_C	DC	*(ships, manoeuvrability, turning circles)* Steady turning diameter		m
D_C'	DCNO	*(ships, manoeuvrability, turning circles)* Non-dimensional steady turning diameter	D_C / L_{PP}	1
D_C	DC	*(fluid mechanics, cavitation)* Cavity drag		N
D_F	DRF	*(fluid mechanics, lifting surfaces, hydrofoil boats)* Foil drag	Force in the direction of motion of an immersed foil	N
D_{FF}	DFF	*(hydrofoil boats)* Drag force on front foil	$C_{DF} A_{FF} q$	N
D_{FR}	DFA	*(hydrofoil boats)* Drag force on rear foil	$C_{DF} A_{FR} q$	N
D_H	DHUL	*(multi-hull vessels)* Hull diameter	Diameter of axis symmetric submerged hulls	m
D^h_{uv}	DH(U,V)	*(ships, basic quantities)*, Generalized hydrodynamic damping	$\partial F^h_u / \partial V_v$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
D_{I}	DRIND	*(fluid mechanics, lifting surfaces, hydrofoil boats)* Induced drag	For finite span foil, the component of lift in the direction of motion	N
D_{INT}	DRINT	*(fluid mechanics, lifting surfaces, hydrofoil boats)* Interference drag	Due to mutual interaction of the boundary layers of intersecting foil	N
D_{n}		*(ships, propulsor geometry, water jets)* Nozzle discharge diameter		m
D_{P}	DRSE	*(fluid mechanics, lifting surfaces)* Section or profile drag at zero lift	Streamline drag	N
Dp		Pressure differential of flow rate transducer		Pa
D_{P0}	DRF0	*(hydrofoil boats)* Profile drag for angle of attack equal to zero lift	Streamline drag	N
D_{PB}	DPB	Maximum Diameter of Pod Body		m
DR	DR	(*fundamental, statistical, stochastic*) Population deviation		
DS	DS	(*fundamental, statistical, stochastic*) Sample deviation		
D_{SP}	DRSP	*(hydrofoil boats)* Spray drag	Due to spray generation	N
D_{ST}	DRST	*(hydrofoil boats)* Strut drag		N
D_{uv}	DA(U,V)	*(ships, unsteady propeller forces)* Generalized damping		
D_{V}	DRVNT	*(hydrofoil boats)* Ventilation drag	Due to reduced pressure at the rear side of the strut base	N
D_{W}	DRWA	*(hydrofoil boats)* Wave drag	Due to propagation of surface waves	N
D_{X}	DX	*(multi-hull vessels)* Hull diameter at the longitudinal position "X"		m
$D_{\mathrm{X}}(f,\theta)$, $D_{\mathrm{X}}(\omega,\mu)$,	DIRSF	*(environmental mechanics, waves)* Directional spreading function	$S(f,\theta)=S(f)D_{\mathrm{X}}(f,\theta)$ where $\int_0^{2\pi} D_{\mathrm{X}}(f,\theta)d\theta = 1$	rad
d	D, DI	*(ships, basic quantities)* Diameter		m
d	DIDR	*(underwater noise)* Distance hydrophone to acoustic centre		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
d	T	*(ships, hull geometry sea-keeping, large amplitude motions capsizing))* Draught, moulded, of ship hull		m
d		*(seakeeping, large amplitude motions capsizing)* Density coefficient for submerged test weights		1
d_A	TA, TAP	*(ships, hull geometry)* Draught at aft perpendicular		m
d_D	CLEARD	*(ships, propulsor geometry)* Propeller tip clearance	Clearance between propeller tip and inner surface of duct	m
d_F	TF, TFP	*(ships, hull geometry)* Draught at forward perpendicular		m
d_h	DH	*(ships, propulsor geometry)* Boss or hub diameter	$2\ r_h$	m
d_{ha}	DHA	Hub diameter, aft	Aft diameter of the hub, not considering any shoulder	m
d_{hf}	DHF	Hub diameter, fore	Fore diameter of the hub, not considering any shoulder	m
d_{KL}	KDROP	*(ships, hull geometry)* Design drop of the keel line	T_{AD} - T_{FD} alias “keel drag”	m
d_M	TM, TMS	*(ships, hull geometry)* Draught at midship	$(T_A + T_F) / 2$ for rigid bodies with straight keel	m
d_{TR}	DTRA	*(planing, semi-displacement vessels)* Immersion of transom, underway	Vertical depth of trailing edge of boat at keel below water surface level	m
$d_{t\psi}$	YART	*(ships, manoeuvrability)* Rate of change of course	$d\psi / dt$	rad/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
E	EL	*(fluid mechanics, flow parameter)* Modulus of elasticity		Pa
E	EM	Mainsail base		m
E	MR	(*fundamental, statistical, stochastic*) Expectation, population mean		
E	E, EN	*(ships, basic quantities)* Energy		J
E	EM	*(sailing vessels)* Mainsail base		m
E_{I}	MEI	*(environmental mechanics, ice)* Modulus of elasticity of ice		Pa
E_{s}		*(ships, hull resistance, water jets)* Total energy flux at station s (kinetic + potential + pressure)	$\iint_{A_s} \rho \left(\frac{1}{2}\boldsymbol{u}^2 + \frac{p}{\rho} - g_j x_j \right) u_i n_i \, dA$	W
$E_{\mathrm{s}\xi}$		*(ships, hull resistance, water jets)* Total axial (in ξ direction) energy flux at station s	$\iint_{A_s} \rho \left(\frac{1}{2}u_\xi^2 + \frac{p}{\rho} - g_j x_j \right) u_i n_i \, dA$	W
e	ED	*(fluid mechanics, flow fields)* Density of total flow energy	$\rho V^2 / 2 + p + \rho g h$	Pa
e_{A}	ENAPP	*(planing, semi-displacement vessels)* Lever of appendage lift force N_{A}	Distance between N_{A} and centre of gravity (measured normally to N_{A})	m
e_{B}	ENBOT	*(planing, semi-displacement vessels)* Lever of bottom normal force N_{B}	Distance between N_{B} and centre of gravity (measured normally to N_{B})	m
$e_{\mathrm{P}N}$	ENPN	*(planing, semi-displacement vessels)* Lever of propeller normal force $N_{\mathrm{P}N}$	Distance between propeller centreline and centre of gravity (measured along shaft line)	m
$e_{\mathrm{P}P}$	ENPP	*(planing, semi-displacement vessels)* Lever of resultant of propeller pressure forces $N_{\mathrm{P}P}$	Distance between $N_{\mathrm{P}P}$ and centre of gravity (measured normally to $N_{\mathrm{P}P}$)	m
e_{PS}	ENPS	*(planing, semi-displacement vessels)* Lever of resultant propeller suction forces N_{PS}	Distance between N_{PS} and centre of gravity (measured normal to N_{PS})	m
$e_{\mathrm{R}P}$	ENRP	*(planing, semi-displacement vessels)* Lever of resultant of rudder pressure forces $N_{\mathrm{R}P}$	Distance between $N_{\mathrm{R}P}$ and centre of gravity (measured normal to $N_{\mathrm{R}P}$)	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
F	CQF	*(fluid mechanics, boundary layers)* Entrainment factor	$1 / (U_e\, dQ / dx)$	1
F	FB	*(hull geometry)* Fore body		
F	FETCH	*(environmental mechanics, wind)* Fetch length	Distance over water the wind blows	m
F	F, F0	*(ships, basic quantities)* Force		N
F		*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Centre of flotation of the water plane		
F		*(seakeeping, large amplitude motions capsizing)* Wind force - IMO/IS		
F^0	F, F0	*(ships, basic quantities)* Force		N
$F^0{}_1$	FX, F0(1), F(1)	*(solid body mechanics, loads)* Force in direction of body axis x		N
$F^0{}_2$	FY, F0(2), F(2)	*(solid body mechanics, loads)* Force in direction of body axis y		N
$F^0{}_3$	FZ, F0(3), F(3)	*(solid body mechanics, loads)* Force in direction of body axis z		N
F_1	FX, F0(1), F(1)	*(solid body mechanics, loads)* Force in direction of body axis x		N
F^1	F1	*(ships, basic quantities)* Moment of forces	First order moment of a force distribution	Nm
$F^1{}_1$	F1(1), F(4)	*(solid body mechanics, loads)* Moment around body axis x		Nm
$F^1{}_2$	F1(2), F(5)	*(solid body mechanics, loads)* Moment around body axis y		Nm
$F^1{}_3$	F1(3), F(6)	*(solid body mechanics, loads)* Moment around body axis z		Nm
F_2	FY, F0(2), F(2)	*(solid body mechanics, loads)* Force in direction of body axis y		Nm
F_3	FZ, F0(3), F(3)	*(solid body mechanics, loads)* Force in direction of body axis z		Nm

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
F_4	F1(1), F(4)	*(solid body mechanics, loads)* Moment around body axis x		Nm
F_5	F1(2), F(5)	*(solid body mechanics, loads)* Moment around body axis y		Nm
F_6	F1(3), F(6)	*(solid body mechanics, loads)* Moment around body axis z		Nm
$\overline{FB}$	XFB	*(seakeeping, large amplitude motions capsizing)* Longitudinal centre of buoyancy, L_{CB}, from forward perpendicular	Distance of centre of buoyancy from forward perpendicular	m
F^C	CIRCF	*(ships, hull resistance)* R.E. Froude's frictional resistance coefficient	$1000\ R_F / (\Delta(K^C)^2)$	1
F_D	SFC	Friction deduction force in self-propulsion test. Skin friction correction in a self-propulsion test carried out at the ship self-propulsion point	Towing force applied to a model to correct the model resistance for different *Re* between model and full scale.	N
$\overline{FF}$	XFF	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal centre of floatation, L_{CF}, from forward perpendicular	Distance of centre of flotation from forward perpendicular	m
$F^F{}_1$	FF(1)	*(ships, basic quantities)* Resistance, Drag (force)	Force opposing translatory velocity, generally for a completely immersed body	N
$F^F{}_2$	FF(2)	*(ships, basic quantities)* Cross force	Force normal to lift and drag (forces)	N
$F^F{}_3$	FF(3)	*(ships, basic quantities)* Lift (force)	Force perpendicular to translatory velocity	N
$\overline{FG}$	XFG	*(ships, hydrostatics, stability)* Longitudinal centre of gravity from forward perpendicular	Distance of centre of gravity from forward perpendicular	m
$\overline{FG}$	XFG	*(seakeeping, large amplitude motions capsizing)* Longitudinal centre of gravity, from forward perpendicular	Distance of centre of gravity from forward perpendicular	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
F_H		*(sailing vessels)* Heeling force of sails		N
$F^\mathrm{h}{}_\mathrm{u}$	FH(U)	*(solid body mechanics, inertial and hydro properties)* Generalized hydrodynamic force		N
F_IN	FNIC	*(ice going vessels)* Normal ice force on a body	Projection of hull - ice interaction force on the external normal	N
F_IT	FTIC	*(ice going vessels)* Tangential ice force on a body	Projection of the hull - ice interaction force on the direction of motion	N
F_i	F(I)	*(ships, unsteady propeller forces)* Vibratory force	i = 1, 2, 3	N
F_L	FS(2)	*(ships, seakeeping)* Wave excited lateral shear force	Alias horizontal!	N
F_N	FS(3)	*(ships, seakeeping)* Wave excited normal shear force	Alias vertical!	N
FP	FP	*(hull geometry)* Fore perpendicular		
F_P	FP	*(ships, performance)* Force pulling or towing a ship		N
F_P0	FP0	*(ships, performance)* Pull during bollard test		N
Fr	FN	*(fluid mechanics, flow parameter)* Froude number	$V / (g\ L)^{1/2}$	1
F_R		*(sailing vessels)* Driving force of sails		N
Fr_c	FNC	*(hydrofoil boats)* Froude number based on chord length	$V / (g\ c_\mathrm{M})^{1/2}$	1
Fr_h	FH	*(fluid mechanics, flow parameter)* Froude depth number	$V / (g\ h)^{1/2}$	1
Fr_I	FNIC	*(ice going vessels)* Froude number based on ice thickness	$V / (g\ h_\mathrm{I})^{1/2}$	1
Fr_L	FNFD	*(hydrofoil boats)* Froude number based on foil distance	$V / (g\ L_\mathrm{F})^{1/2}$	1
Fr_∇	FV	*(fluid mechanics, flow parameter)* Froude displacement number	$V / (g\ \nabla^{1/3})^{1/2}$	1
$F^\mathrm{S}{}_i$	FS(I)	*(solid body mechanics, loads)* Shearing force	$F^{S0}{}_2$, $F^{S0}{}_3$	N

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
F^{S}_{u}	FS(U)	*(solid body mechanics, loads)* Force or load acting at a given planar cross-section of the body, generalized, in section coordinates!	$F^{S}_{i} = F^{S0}_{i}$ $F^{S}_{3+i} = F^{S1}_{i} = M^{B}_{i}$	N Nm
F^{T}	FT, FS(1)	*(solid body mechanics, loads)* Tensioning or normal force	F^{S0}_{1}	N
F_{TA}	FTAPP	*(planing, semi-displacement vessels)* Appendage drag force (parallel to reference line)	Drag forces arising from appendages inclined to flow, assumed to act parallel to the reference line	N
F_{TB}	FTBOT	*(planing, semi-displacement vessels)* Bottom frictional force (parallel to reference line)	Viscous component of bottom drag forces assumed acting parallel to the reference line	N
F_{TK}	FTKL	*(planing, semi-displacement vessels)* Keel or skeg drag force (parallel to reference line)	Drag forces arising from keel or skeg, assumed to act parallel to the reference line	N
F_{TRP}	FTRP	*(planing, semi-displacement vessels)* Additional rudder drag force (parallel to reference line)	Drag forces arising from influence of propeller wake on the rudder assumed to act parallel to the reference line	N
F_{u}	F(U)	*(solid body mechanics, loads)* Force, generalized, load, in body coordinates	$M^{F}_{u} = M^{M}_{u}$ $F_{i} = F^{0}_{i}$ $F_{3+i} = F^{1}_{i}$	N
F_{u}	FG(I)	*(ships, unsteady propeller forces)* Generalized vibratory force	u = 1,.., 6 u = 1, 2, 3: force u = 4, 5, 6: moment	N N Nm
F_{V}		*(sailing vessels)* Vertical force of sails		N
F_{XI}	FXIC	*(ice going vessels)* Components of the local ice force		N
F_{x}	*X*PF	(*fundamental, statistical*) Probability function (distribution) of a random quantity		1
F_{x}	FX, F0(1), F(1)	*(solid body mechanics, loads)* Force in direction of body axis *x*		Nm
F_{xy}	*XY*PF	(*fundamental, statistical*) Joint probability function (distribution) function of two random quantities		1
F_{YI}	FYIC	*(ice going vessels)* Components of the local ice force		N

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
F_y	FY, F0(2), F(2)	*(solid body mechanics, loads)* Force in direction of body axis *y*		N
F_{ZI}	FZIC	*(ice going vessels)* Components of the local ice force		N
F_z	FZ, F0(3), F(3)	*(solid body mechanics, loads)* Force in direction of body axis *z*		N
f		*(uncertainty)* Function	Functional relationship between measurand Y and input quantities X_i on which Y depends, and between output estimate y and input estimates x_i on which y depends.	1
f	FR	(*fundamental, time and frequency domain quantity, ships, seakeeping, environmental mechanics, wave, ships, basic quantities*) Frequency	$2\pi\omega=1 / T$	Hz
f	FREB	*(ships, hull geometry, hydrostatics, stability, seakeeping, large amplitude motions, capsizing)* Freeboard	From the freeboard markings to the freeboard deck, according to official rules	m
f	FBP	*(ships, propulsor geometry)* Camber of a foil section		m
f	FM	*(ships, appendage geometry)* Camber of an aerofoil or a hydrofoil	Maximum separation of median and nose-tail line	m
f	FC	*(ships, hull resistance)* Friction coefficient	Ratio of tangential force to normal force between two sliding bodies	1
f_{AA}	FRAA	*(planing, semi-displacement vessels)* Lever of wind resistance R_{AA}	Distance between R_{AA} and centre of gravity (measured normal to R_{AA})	m
f_{AP}	FRAP	*(planing, semi-displacement vessels)* Lever of appendage drag R_{AP}	Distance between R_{AP} and centre of gravity (measured normal to R_{AP})	m
f_{BL}	CABL	*(ships, hull geometry)* Area coefficient for bulbous bow	$A_{BL} / (L\ T)$	1
f_{BT}	CABT	*(ships, hull geometry)* Taylor sectional area coefficient for bulbous bow	A_{BT} / A_X	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
f_C	FC	(*fundamental, time and frequency domain quantity*) Basic frequency in repeating functions	$1 / T_C$	Hz
f_D	FD	*(ships, propulsor geometry)* Camber of duct profile		m
f_E	FE	*(ships, seakeeping)* Frequency of wave encounter	$1 / T_E$	Hz
f_F	FRF	*(planing, semi-displacement vessels)* Lever of frictional resistance R_F	Distance between R_F and centre of gravity (measured normal to R_F)	m
f_{ID}	CFRD	*(ice going vessels)* Coefficient of friction between surface of body and ice (dynamic)	Ratio of tangential force to normal force between two bodies (dynamic condition)	1
f_{IS}	CFRS	*(ice going vessels)* Coefficient of friction between surface of body and ice (static)	The same as above (static condition)	1
f_i	FS(I)	*(fluid mechanics, flow fields)* Mass specific force	Strength of force fields, usually only gravity field g_i	m/s^2
f_K	FRK	*(planing, semi-displacement vessels)* Lever of skeg or keel resistance R_K	Distance between R_K and centre of gravity (measured normal to R_K)	m
f_L	FML	*(fluid mechanics, lifting surfaces)* Camber of lower side (general)		m
f_P	FRPK	*(environmental mechanics, waves)* Spectral peak in frequency	Frequency at which the spectrum has its maximum	Hz
f_R	FRRC	*(environmental mechanics, waves)* Frequency resolution	$1 / T_R$	Hz
f_R	FDRR	*(planing, semi-displacement vessels)*Lever of augmented rudder drag ΔR_{RP}	Distance between ΔR_{RP} and centre of gravity (measured normal to ΔR_{RP})	m
f_S	FS, FRSA	(*fundamental, time and frequency domain quantity, environmental mechanics, waves*) Frequency of sampling, Sample frequency	$1 / T_S$ period in repeating spectra	Hz
f_S	FSL	*(planing, semi-displacement vessels)* Lever of axial propeller thrust	Distance between axial thrust and centre of gravity (measured normal to shaft line)	m
f_T	FRT	*(planing, semi-displacement vessels)* Lever of total resistance R_T	Distance between R_T and centre of gravity (measured normal to R_T)	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
f_{T}	ATR	*(ships, hull geometry)* Sectional area coefficient for transom stern	$A_{\mathrm{T}} / A_{\mathrm{X}}$	1
f_{U}	FMU	*(fluid mechanics, lifting surfaces)* Camber of upper side		m
f_{W}	FW	*(environmental mechanics, waves)* Basic wave frequency	$1 / T_{\mathrm{W}}$	Hz
$f_{\mathrm{W}i}$	FW(I)	*(environmental mechanics, waves)* Frequencies of harmonic components of a periodic wave	$i\, f_{\mathrm{W}}$	Hz
f_x	*X*PD	(*fundamental, statistical*) Probability density of a random quantity	$d\, F_x / dx$	
f_{xy}	*XY*PD	(*fundamental, statistical*) Joint probability density of two random quantities	$\partial^2 F_{xy} / (\partial x \partial y)$	
f_z		*(ships, seakeeping)* Natural frequency of heave	$1 / T_z$	Hz
f_θ		*(ships, seakeeping)* Natural frequency of pitch	$1 / T_\theta$	Hz
f_φ		*(ships, seakeeping)* Natural frequency of roll	$1 / T_\varphi$	Hz

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
G		*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Centre of gravity of a vessel		
$G^0 i$, G_i	G0(I)	*(solid body mechanics, loads)* Gravity or weight force in body coordinates!	$G_i = G^0{}_i = m^0{}_{ij}\, g_j$ $= m g_i$	N
$G^1{}_i$	G1(I)	*(solid body mechanics, loads)* Gravity or weight moment in body coordinates!	$G_{3+i} = G^1{}_i = \varepsilon_{ikj}\, x_k\, G^0{}_j$ $= m^1{}_{ij}\, g_j$	Nm
$\overline{GG}_1$	GGV	*(seakeeping, large amplitude motions capsizing)* Vertical stability lever caused by a weight shift or weight addition	$\overline{KG}_1 = \overline{KG}_0 + \overline{GG}_1$	m
$\overline{GG}_{\mathrm{H}}$	GGH	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Horizontal stability lever caused by a weight shift or weight addition		m
$\overline{GG_L}$	GGL	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Longitudinal stability lever caused by a weight shift or weight addition		m
$\overline{GG}_{\mathrm{V}}$	GG1	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Vertical stability lever caused by a weight shift or weight addition	$\overline{KG_1}=\overline{KG_0}+\overline{\mathrm{GG}_1}$	m
$\overline{GM}$	GM	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Transverse metacentric height	Distance of centre of gravity to the metacentre $\overline{GM} = \overline{KM} - \overline{KG}$ (not corrected for free surface effect)	m
$\overline{GM}_{\mathrm{EFF}}$	GMEFF	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Effective transverse metacentric height	$\overline{GM}$ Corrected for free surface and/or free communication effects	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$\overline{GM}_L$	GML	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Longitudinal metacentric height	Distance from the centre of gravity G to the longitudinal metacentre M_L $\overline{GM}_L = \overline{KM}_L - \overline{KG}$	m
G_u	G(U)	*(solid body mechanics, loads)* Gravity or weight force, generalized, in body coordinates!	$G_u = m_{uv}\, g_v$	N
$\overline{GZ}$		*(seakeeping, large amplitude motions capsizing)* Arm of static stability corrected for free surfaces - IMO/table		m
$\overline{GZ}$	GZ	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Righting arm or lever	$\overline{GZ} = \overline{AZ} - \overline{AG}_{\mathrm{V}} \sin\varphi - \overline{AG}_{\mathrm{T}} \cos\varphi$	m
$\overline{GZ}_{\mathrm{MAX}}$	GZMAX	*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Maximum righting arm or lever		m
G_{Z}	GAP	*(ships, propulsor geometry)* Gap between the propeller blades	$2\,\pi\, r \sin(\varphi)\, /\, \mathrm{z}$	m
g	G, GR	*(ships, basic quantities)* Acceleration of gravity	Weight force / mass, strength of the earth gravity field	m/s^2
g		*(seakeeping, large amplitude motions capsizing, ships, hydrostatics, stability)* Centre of gravity of an added or removed weight (mass)		1
g^E	GMR	(*fundamental, statistical*) Expected value of a function of a random quantity	$E(g) = \int g(x) f_x(x) dx$ $x = -\infty \ldots \infty$	
g_i	G1(I)	*(solid body mechanics, loads)* Gravity field strength, in body coordinates!		m/s^2
g^M	GMR	(*fundamental, statistical*) Expected value of a function of a random quantity	$E(g) = \int g(x) f_x(x) dx$ $x = -\infty \ldots \infty$	
g^{MR}	GMR	(*fundamental, statistical*) Expected value of a function of a random quantity	$E(g) = \int g(x) f_x(x) dx$ $x = -\infty \ldots \infty$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$g^{M\mathrm{R}}$	*G*MR	(*fundamental*, *statistical*, *stochastic*) Mean of a function of a random quantity	$M(g(t)) = \lim(1/T \int g(t) dt)$ $t = -T/2 \ldots +T/2$ $T = -\infty \ldots +\infty$	
$g^{M\mathrm{S}}$	*G*MS	(*fundamental*, *statistical*, *stochastic*) Average or sample mean of a function of a random quantity	$A(g(t)) = 1/T \int g(t) dt$ $t = 0 \ldots +T$	
g_{u}	G(U)	*(solid body mechanics, loads)* Gravity field strength, generalized, in body coordinates	$g_i = g^1{}_i$ $g_{3+i} = 0$	m/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
H	HT	*(fluid mechanics, flow fields)* Total head	$e / w = h + p/w + q/w$	m
H	HT	*(ships, basic quantities)* Height		m
H	HBL	*(fluid mechanics, boundary layers)* Boundary layer shape parameter	δ^* / Θ	1
H		*(sailing vessels)* Side force		N
H_1	HT1	*(ships, hull resistance, water jets)* Local total head at station 1		m
H_{35}	H35	*(ships, hull resistance, water jets)* Mean increase of total head across pump and stator or several pump stages		m
H_{CG}	HVCG	*(ACV and SES)* Height of centre of gravity above mean water plane beneath craft		m
H_{DK}	HCLDK	*(multi-hull vessels)* Deck clearance	Minimum clearance of wet deck from water surface at rest	m
H_d	HD	*(environmental mechanics, waves)* Wave height by zero down-crossing	The vertical distance between a crest and a successive trough.	m
H_E	HQF	*(fluid mechanics, boundary layers)* Entrainment shape parameter	$(\delta - \delta^*) / \Theta$	1
H_H	HH	*(ACV and SES)* Vertical spacing between inner and outer side skirt hinges or attachment points to structure	needs clarification	m
H_{ij}		*(ships, propulsor geometry, water jets)* Head between station *i* and *j*		m
H_{JS}		*(ships, propulsor geometry, water jets)* Jet System Head		m
HL		*(seakeeping, large amplitude motions capsizing)* Heeling lever (due to various reasons) - IMO/HSC'2000		
H_{mo}	HMO	*(environmental mechanics, waves)* Significant wave height based on zeroth moment for narrow banded spectrum	$4\ (m_0)^{1/2}$	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
H_N	HTNT	*(fluid mechanics, cavitation)* Net useful head of turbo-engines		m
H_{SK}	HSK	*(ACV and SES)* Skirt depth		m
H_{SS}	HSS	*(multi-hull vessels)* Strut submerged depth	Depth of strut from still water line to strut-hull intersection	m
H_{TC}	HTC	*(ships, propulsor geometry)* Hull tip clearance	Distance between the propeller sweep circle and the hull	m
H_U	HTUS	*(fluid mechanics, cavitation)* Total head upstream of turbo-engines		m
H_u	HU	*(environmental mechanics, waves)* Wave height by zero up-crossing	The vertical distance between a trough and a successive crest	m
H_W	HW	*(environmental mechanics, waves)* Wave height	The vertical distance from wave crest to wave trough, or twice the wave amplitude of a harmonic wave. η_C - η_T	m
$H_{W1/3}$	H13D	*(environmental mechanics, waves)* Significant wave height	Average of the highest one third zero down-crossing wave heights	m
$H_{W1/3d}$	H13D	*(environmental mechanics, waves)* Zero down-crossing significant wave height	Average of the highest one third zero down-crossing wave heights	m
$H_{W1/3u}$	H13U	*(environmental mechanics, waves)* Zero up-crossing significant wave height	Average of the highest one third zero up-crossing wave heights	m
H_{WV}	HWV	*(environmental mechanics, waves)* Wave height estimated from visual observation		m
H_σ	HWDS	*(environmental mechanics, waves)* Estimate of significant wave height from sample deviation of wave elevation record		m
h	HS	*(fluid mechanics, flow fields)* Static pressure head	Δz_0 , z_0-axis positive vertical up!	m
h	DE	*(ships, basic quantities, ships, manoeuvrability)* Depth, Water depth		m
h		*(seakeeping, large amplitude motions capsizing)* Maximum tank height		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
h		*(seakeeping, large amplitude motions capsizing)* Vertical distance from the centre of A to the waterline		m
h_0	H0	*(ships, propulsor geometry)* Immersion	The depth of submergence of the propeller measured vertically from the propeller centre to the free surface	m
h_{1A}		*(ships, propulsor geometry, water jets)* maximum height of cross sectional area of stream tube at station 1A		m
h_{BS}	HBS	*(ACV and SES)* Bow seal height	Distance from side wall keel to lower edge of bow seal	m
h_{CE}		*(seakeeping, large amplitude motions capsizing)* Height of centre of area of A_{SP} above waterline at SSM		m
h_{CG}	HVCG	*(hydrofoil boats)* Height of centre of gravity foil borne	Distance of centre of gravity above mean water surface	m
h_F	HFL	*(hydrofoil boats)* Flight height	Height of foil chord at foil borne mode above position at rest	m
h_I	HTIC	*(ice going vessels)* Thickness of ice		m
h_J	HJ	*(ships, propulsor geometry, water jets)* Height of jet centreline above undisturbed water surface		m
h_K	HKE	*(hydrofoil boats)* Keel clearance	Distance between keel and mean water surface foil borne	m
h_{LP}		*(seakeeping, large amplitude motions capsizing)* Height of waterline above centre of area of immersed profile		m
h_M	DEME	*(ships, manoeuvrability)* Mean water depth		m
h_P	HSP	*(planing, semi-displacement vessels)* Wetted height of strut palms (flange mounting)		m
h_R	HRU	*(planing, semi-displacement vessels)* Wetted height of rudders		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
h_{SN}	HTSN	*(ice going vessels)* Thickness of snow cover		m
h_{SS}	HSS	*(ACV and SES)* Stern seal height	Distance from side wall keel to lower edge of stern seal	m
h_{R}	HRU	*(planing, semi-displacement vessels)* Wetted height of rudders		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
I	IM	(*fundamental, time and frequency domain quantity*) Imaginary variable		1
I	ID	*(fluid mechanics, flow fields)* Induction factor	Ratio between velocities induced by helicoidal and by straight line vortices	1
I	I, IN	*(ships, basic quantities)* Moment of inertia	Second order moment of a mass distribution	kg m^2
I	I	*(sailing vessels)* Fore triangle height		m
I_{12} I_{23} I_{31}	I2(1,2) I2(2,3) I2(3,1)	*(solid body mechanics, inertial and hydro properties)* Real products of inertia in case of non-principal axes		kg m^2
I^{h}_{uv}	IH(U,V)	*(solid body mechanics, inertial and hydro properties)* Generalized hydrodynamic inertia	$\partial F_u^h / \partial \dot{\mathrm{V}}_v$	
I_{ij}	IN(I,J)	*(solid body mechanics, inertial and hydro properties)* Second moments of mass, i.e. inertia distribution	Alias mass moments of inertia	kg m^2
I_{AS}	ASI	*(seakeeping, large amplitude motions capsizing)* Attained subdivision index		1
I_{L}	IL	*(solid body mechanics, inertial and hydro properties)* Longitudinal second moment of water-plane area	About transverse axis through centre of floatation	m^4
I_{T}	IT	*(solid body mechanics, inertial and hydro properties)* Transverse second moment of water-plane area	About longitudinal axis through centre of floatation	m^4
I_{VR}	IVR	*(ships, hull resistance, water jets)* Intake velocity ratio	V_I/V	1
I_{xy}	IXY	*(solid body mechanics, inertial and hydro properties)* Real products of inertia in case of non-principal axes		kg m^2
I_y , I_{yy},	IY, IYY,	*(solid body mechanics, inertial and hydro properties)* Pitch moment of inertia around the principal axis *y*		kg m^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
I_{yz}	IYZ	*(solid body mechanics, inertial and hydro properties)* Real products of inertia in case of non-principal axes		kg m^2
I_z , I_{zz}	IZ, IZZ,	*(solid body mechanics, inertial and hydro properties)* Yaw moment of inertia around the principal axis z		kg m^2
I_{zx}	IZX	*(solid body mechanics, inertial and hydro properties)* Real products of inertia in case of non-principal axes		kg m^2
i	I	(*fundamental, time and frequency domain quantity*) Imaginary unit	$\sqrt{-1}$	1
i_{EI}	ANENIN	*(multi-hull vessels)* Half angle of entrance at tunnel (inner) side	Angle of inner water line with reference to centre line of demihull	rad
i_{EO}	ANENOU	*(multi-hull vessels)* Half angle of entrance at outer side	Angle of outer water line with reference to centre line of demihull	rad
i_{E}	ANEN	*(ships, hull geometry)* Angle of entrance, half	Angle of waterline at the bow with reference to centre plane, neglecting local shape at stem	rad
i_{G}	RK	*(ships, propulsor geometry)* Rake ISO symbol: Rk	The distance between the propeller plane and the generator line in the direction of the shaft axis. Aft displacement is positive rake.	m
i_{R}	ANRU	*(ships, hull geometry)* Angle of run, half	Angle of waterline at the stern with reference to the centre-plane, neglecting local shape of stern frame	rad
i_{S}	RAKS	*(ships, propulsor geometry)* Rake, skew-induced	The axial displacement of a blade section which occurs when the propeller is skewed. Aft displacement is positive rake	m
i_{T}	RAKT	*(ships, propulsor geometry)* Rake, total	The axial displacement of the blade reference line from the propeller plane $i_{\mathrm{G}} + i_{\mathrm{S}} = c_{\mathrm{S}} \sin\varphi$ Positive direction is aft.	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
J	JEI	*(ships, propulsor performance)* Propeller advance ratio	$V_{\mathrm{A}} / (D\ n)$	1
J	J	*(sailing vessels)* Fore triangle base		m
J_{A}	JA	*(ships, propulsor performance)* Apparent or hull advance ratio	$V / (D\ n) = V_{\mathrm{H}} / (D\ n)$	1
J_{H}	JH	*(ships, propulsor performance)* Apparent or hull advance ratio	$V / (D\ n) = V_{\mathrm{H}} / (D\ n)$	1
J_{P}	JP	*(ships, propulsor performance)* Propeller advance ratio for ducted propeller	$V_{\mathrm{P}} / (D\ n)$	1
$J_{\mathrm{P}Q}$	JPQ	*(ships, propulsor performance)* Advance ratio of propeller determined from torque identity		1
$J_{\mathrm{P}T}$	JPT	*(ships, propulsor performance)* Advance ratio of propeller determined from thrust identity		1
J_Q	JQ	*(ships, propulsor performance)* Advance ratio of propeller determined from torque identity		1
J_T	JT	*(ships, propulsor performance)* Advance ratio of propeller determined from thrust identity		1
J_{VR}	JVR	*(ships, hull resistance, water jets))* Jet velocity ratio	V_{J}/V	1
j	J	(*fundamental, time and frequency domain quantity*) Integer values	$-\infty \ldots +\infty$	s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
K		*(ships, hydrostatics, stability seakeeping, large amplitude motions capsizing)* Keel reference		
K	MX	*(ships, manoeuvrability, seakeeping, solid body mechanics, loads)* Roll moment on body, moment about body *x*-axis		Nm
K	KS	*(ships, manoeuvrability, seakeeping)* Gain factor in linear manoeuvring equation		1/s
K	K	*(solid body mechanics, loads)* Moment around body axis *x*		Nm
K_1	C1	*(ships, performance)* Ship model correlation factor for propulsive efficiency	η_{DS} / η_{DM}	1
K_2	C2	*(ships, performance)* Ship model correlation factor for propeller rate revolution	n_S / n_M	1
$\overline{KA}$	ZKA	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Assumed centre of gravity above moulded base or keel	Distance from the assumed centre of gravity A to the moulded base or keel K	m
K_{APP}	KAP	*(ships, performance)* Appendage correction factor	Scale effect correction factor for model appendage drag applied at the towing force in a self-propulsion test	1
$\overline{KB}$	ZKB	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Centre of buoyancy above moulded base or keel	Distance from the centre of buoyancy B to the moulded base or keel K	m
K^C	CIRCK	*(ships, hull resistance)* R.E. Froude's speed displacement coefficient	$(4\,\pi)^{1/2}\, Fr_\nabla$ or $(4\pi/g)^{1/2} V_K / \nabla^{1/6}$	1
K_{Fi}	KF(I)	*(ships, unsteady propeller forces)* Vibratory force coefficients	$F_i / (\rho\, n^2 D^4)$	1
K_{Fu}	KF(U)	*(ships, unsteady propeller forces)* Generalized vibratory force coefficients	According to definitions of K_{Fi} and K_{Mi}	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$\overline{KG}$	ZKG	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Centre of gravity above moulded base or keel	Distance from centre of gravity G to the moulded base or keel K	m
$\overline{Kg}$	ZKAG	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Vertical centre of gravity of added or removed weight above moulded base or keel	Distance from centre of gravity, g, to the moulded base or keel K	m
K_H		*(ships, propulsor geometry, water jets)* Head coefficient:	$\frac{gH}{n^2 D^5}$	
$\overline{KM}$	ZKM	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Transverse metacentre above moulded base or keel	Distance from the transverse metacentre M to the moulded base or keel K	m
K_{Mi}	KM(I)	*(ships, unsteady propeller forces)* Vibratory moment coefficients	$M_i / (\rho\, n^2\, D^5)$	1
$\overline{KM}_L$	ZKML	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal metacentre above moulded base or keel	Distance from the longitudinal metacentre M_L to the moulded base or keel K	m
K_P	KP	*(ships, propulsor performance)* Delivered power coefficient	$P_D / (\rho\, n^3\, D^5) = 2\, \pi\, K_Q$	1
K_p	KPR	*(ships, unsteady propeller forces)* Pressure coefficient	$p / (\rho\, n^2\, D^2)$	1
K_Q	KQ	*(ships, propulsor performance, hull resistance, water jets))* Torque coefficient	$Q / (\rho\, n^2\, D^5)$	1
K_{QJ}		*(ships, hull resistance, water jets)* Flow rate coefficient:	$\frac{Q_J}{nD^3}$	1
K_{Q0}	KQ0	*(ships, propulsor performance)* Torque coefficient of propeller converted from behind to open water condition	$K_Q \cdot \eta_R$	1
K_{QT}	KQT	*(ships, propulsor performance)* Torque coefficient of propeller determined from thrust coefficient identity		1
K_{QIA}	KQICMS	*(ice going vessels)* Average coefficient of torque in ice	$Q_{IA} / (\rho_W\, n_{IA}^2\, D^5)$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
K_{SC}	KSC	*(ships, propulsor performance)* Centrifugal spindle torque coefficient	$Q_{\mathrm{SC}} / (\rho\, n^2 D^5)$	1
K_{SH}	KSH	*(ships, propulsor performance)* Hydrodynamic spindle torque coefficient	$Q_{\mathrm{SH}} / (\rho\, n^2 D^5)$	1
K_R	KR	*(ships, hull resistance)* Resistance coefficient corresponding to K_Q, K_T	$R / (\rho\, D^4 n^2)$	1
K_T	KT	*(ships, propulsor performance)* Thrust coefficient	$T / (\rho\, n^2 D^4)$	1
$K_{T\mathrm{D}}$	KTD	*(ships, propulsor performance)* Duct thrust coefficient	$T_{\mathrm{D}} / (\rho\, n^2 D^4)$	1
$K_{T\mathrm{IA}}$	KTICMS	*(ice going vessels)* Average coefficient of thrust in ice	$T_{\mathrm{IA}} / (\rho_{\mathrm{W}}\, n_{\mathrm{IA}}^2 D^4)$	1
$K_{T\mathrm{P}}$	KTP	*(ships, propulsor performance)* Ducted propeller thrust coefficient	$T_{\mathrm{P}} / (\rho\, n^2 D^4)$	1
$K_{T\mathrm{T}}$	KTT	*(ships, propulsor performance)* Total thrust coefficient for a ducted propeller unit	$K_{T\mathrm{P}} + K_{T\mathrm{D}}$	1
k		*(uncertainty)* Coverage factor	For calculation of expanded k uncertainty $U = k u_{\mathrm{c}}(y)$	1
k	HK	*(fluid mechanics, flow parameter)* Roughness height or magnitude	Roughness height, usually in terms of some average	m
k	WN	*(environmental mechanics, waves)* Wave number	$2\,\pi / L_{\mathrm{W}} = \omega^2/g$	1/m
k	K	*(ships, hull resistance)* Three dimensional form factor on flat plate friction	$(C_{\mathrm{V}} - C_{\mathrm{F0}}) / C_{\mathrm{F0}}$	1
k	RDGX	*(solid body mechanics, inertial and hydro properties)* Roll radius of gyration around the principal axis x	$(I_{xx}/m)^{1/2}$	m
k		*(seakeeping, large amplitude motions capsizing)* Roll damping coefficient expressing the effect of bilge keels		1
k_p		*(uncertainty)* Coverage factor for probability p	For calculation of expanded uncertainty $U_p = k_p u_{\mathrm{c}}(y)$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
k_P	KP	*(ships, resistance and propulsion, propulsor performance)* Roughness height of Propeller blade surface		m
k_S	SK	*(fluid mechanics, flow parameter)* Sand roughness	Mean diameter of the equivalent sand grains covering a surface	m
k_S	KHS	*(ships, resistance and propulsion, ship performance)* Roughness height of Hull surface		m
k_x, k_{xx}	RDGX	*(solid body mechanics, inertial and hydro properties)* Roll radius of gyration around the principal axis x	$(I_{xx}/m)^{1/2}$	m
k_y, k_{yy}	RDGY	*(solid body mechanics, inertial and hydro properties)* Pitch radius of gyration around the principal axis y	$(I_{yy}/m)^{1/2}$	m
k_z, k_{zz}	RDGZ	*(solid body mechanics, inertial and hydro properties)* Yaw radius of gyration around the principal axis z	$(I_{zz}/m)^{1/2}$	m
$k(\theta)$	WDC	*(ships, hull resistance)* Wind direction coefficient	$C_\mathrm{AA}/ C_\mathrm{AA0}$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
L	L	*(ships, hull geometry)* Length of ship	Reference length of ship (generally length between the perpendiculars)	m
L	L, LE	*(ships, basic quantities)* Length		m
L	FF(3)	*(ships, basic quantities)* Lift (force)	Force perpendicular to translatory velocity	N
L		*(seakeeping, large amplitude motions capsizing)* Length of the vessel on the waterline in maximum load condition - IMO/IS		m
L_0	LF0	*(fluid mechanics, lifting surfaces)* Lift force for angle of attack of zero	$C_{L0} A_{\mathrm{FT}} q$	N
L_0	LF0	*(hydrofoil boats)* Profile lift force for angle of attack of zero	$C_{L0} A_{\mathrm{FT}} q$	N
L_{B}	LB	*(ACV and SES)* Deformed bag contact length		m
L_{b}	LSB	*(ships, manoeuvrability, seakeeping)* Static stability lever	N_v / Y_v	m
L_{C}	LC	*(planing, semi-displacement vessels)* Wetted chine length, underway		m
L_{C}	LAC	*(ACV and SES)* Cushion length		m
L_{CB}	XCB	*(ships, hydrostatics, stability)* Longitudinal centre of buoyancy (LCB)	Longitudinal distance from reference point to the centre of buoyancy, B such as X_{MCF} from Midships	m
L_{CF}	XCF	*(ships, hydrostatics, stability)* Longitudinal centre of flotation (LCF)	Longitudinal distance from reference point to the centre of flotation, F such as X_{MCF} from Midships	m
L_{CG}	XCG	*(ships, hydrostatics, stability)* Longitudinal centre of gravity (LCG)	Longitudinal distance from a reference point to the centre of gravity, G such as X_{MCG} from Midships	m
L_{CH}	LCH	*(multi-hull vessels)* Length of centre section of hull	Length of prismatic part of hull	m
L_{CS}	LCS	*(multi-hull vessels)* Length of centre section of strut	Length of prismatic part of strut	m
L_{D}	LD	*(ships, propulsor geometry)* Duct length		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
L_{DEN}	LDEN	*(ships, propulsor geometry)* Duct entry part length	Axial distance between leading edge of duct and propeller plane	m
L_{DEX}	LDEX	*(ships, propulsor geometry)* Duct exit length	Axial distance between propeller plane and trailing edge of duct	m
L_{d}	LSR	*(ships, manoeuvrability, seakeeping)* Damping stability lever	$(N_r - mux_{\mathrm{G}}) / (Y_r - mu)$	m
L_{E}	LEN	*(ships, hull geometry)* Length of entrance	From the forward perpendicular to the forward end of parallel middle body, or maximum section	m
L_{E}	LACE	*(ACV and SES)* Effective length of cushion	$A_{\mathrm{C}} / B_{\mathrm{C}}$	m
L_{EFF}	LEFF	*(sailing vessels)* Effective length for Reynolds Number		m
L_{F}	LF	*(ships, appendage geometry)* Length of flap or wedge	Measured in direction parallel to keel	m
L_{F}	LF	*(hydrofoil boats)* Lift force on foil	$C_L A_{\mathrm{FT}}\, q$	N
L_{FF}	LFF	*(hydrofoil boats)* Lift force on front foil	$C_L A_{\mathrm{FF}}\, q$	N
L_{FR}	LFR	*(hydrofoil boats)* Lift force on rear foil	$C_L A_{\mathrm{FR}}\, q$	N
L_{FS}	LFS	*(ships, hull geometry)* Frame spacing	used for structures	m
L_{H}	LH	*(multi-hull vessels)* Box length	Length of main deck	m
L_{H}	LH	*(ACV and SES)* Horizontal spacing between inner and outer side skirt hinges or attachment points to structure	needs clarification	m
L_{HY}		*(sailing vessels)* Hydrodynamic lift force		N
L_{K}	LK	*(planing, semi-displacement vessels)* Wetted keel length, underway		m
L_{M}	LM	*(planing, semi-displacement vessels)* Mean wetted length, underway	$(L_{\mathrm{K}} + L_{\mathrm{C}}) / 2$	m
L_{NH}	LNH	*(multi-hull vessels)* Length of nose section of hull	Length of nose section of hull with variable diameter	m
L_{NS}	LNS	*(multi-hull vessels)* Length of nose section of strut	Length of nose section of strut with variable thickness	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
L_{OA}	LOA	*(ships, hull geometry)* Length, overall		m
L_{OS}	LOS	*(ships, hull geometry)* Length, overall submerged		m
L_{P}	LP	*(ships, hull geometry)* Length of parallel middle body	Length of constant transverse section	m
L_p	SPL	*(underwater noise)* Sound pressure level	$L_p = 10\log_{10}\left(\frac{\bar{p}_{rms}^2}{p_{ref}^2}\right)$ dB, $p_{ref} = 1$ μPa	
L_{PB}	LPB	*(ships, hull geometry)* Length of Pod Main Body		m
L_{PBF}	LPBF	*(ships, hull geometry)* Length of Bottom Fin	Code length of bottom fin under pod main body	m
L_{PP}	LPP	*(ships, hull geometry)* Length between perpendiculars		m
L_{PR}	LPRC	*(planing, semi-displacement vessels)* Projected chine length	Length of chine projected in a plane parallel to keel	m
L_{PS}	LPS	*(ships, hull geometry)* Length of Upper Strut	Code length of strut between forward edge and aft edge	m
L_{R}	LRU	*(ships, hull geometry)* Length of run	From section of maximum area or after end of parallel middle body to waterline termination or other designated point of the stern	m
L_{S}	LS	*(multi-hull vessels)* Strut length	Length of strut from leading to trailing edge	m
L_{S}	LS	*(ACV and SES)* Distance of leading skirt contact point out-board or outer hinge of attachment point to structure	needs clarification	m
L_{s}	SRNL	*(underwater noise)* Underwater sound radiated noise level at a reference distance of 1m	$L_{\mathrm{s}} = L_{\mathrm{p}} + 20\,\log_{10}\left[\frac{d}{d_{ref}}\right]$ dB, $d_{ref} = 1$ m	
L_{SB}	LSB	*(planing, semi-displacement vessels)* Total length of shafts and bossings		m
L_{SH}	LSH	*(multi-hull vessels)* Length of submerged hull		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
L_{SS}	LSS	*(ships, hull geometry)* Station spacing		m
L_{TO}	LT0	*(hydrofoil boats)* Lift force at take off	$C_{LTO} A_{\mathrm{FT}}\, q$	N
L_{VHD}	LVD	*(planing, semi-displacement vessels)* Vertical component of hydrodynamic lift		N
L_{VS}	LVS	*(planing, semi-displacement vessels)* Hydrostatic lift	Due to buoyancy	N
L_{W}	LW	*(environmental mechanics, waves)* Wave length	The horizontal distance between adjacent wave crests in the direction of advance	m
L_{WV}	LWV	*(environmental mechanics, waves)* Wave length estimated by visual observation	Measured in the direction of wave propagation	m
L_{WL}	LWL	*(ships, hull geometry)* Length of waterline		m
l	XTA	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal trimming arm	X_{CG} - X_{CB}	m
l		*(seakeeping, large amplitude motions capsizing)* Arm of dynamic stability corrected for free surfaces - IMO/table		m
l		*(seakeeping, large amplitude motions capsizing)* Maximum tank length		m
l_{b}	LSB	*(ships, manoeuvrability, seakeeping)* Static stability lever	N_v / Y_v	m
l_{C}	LC	*(fluid mechanics, cavitation)* Cavity length	Streamwise dimension of a fully-developed cavitating region	m
l_{CP}	LCP	*(planing, semi-displacement vessels)* Lever of resultant of pressure forces, underway	Distance between centre of pressure and aft end of planing surface	m
l_{d}	LSR	*(ships, manoeuvrability, seakeeping)* Damping stability lever	$(N_r - mux_{\mathrm{G}}) / (Y_r - mu)$	m
l_{F}	LEFF	*(hydrofoil boats)* Horizontal distance of centre of pressure of front foil to centre of gravity		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
l_{FR}	LEFR	*(hydrofoil boats)* Horizontal distance between centres of pressure of front and rear foils	$l_{\mathrm{F}} + l_{\mathrm{R}}$	m
l_{h}	LH	Hub length	The length of the hub, including any fore and aft shoulder	m
l_{ha}	LHA	Hub length, aft	Length of the hub taken from the propeller plane to the aft end of the hub including aft shoulder	m
l_{hf}	LHF	Hub length, fore	Length of the hub taken from the propeller plane to the fore end of the hub including fore shoulder	m
l_{R}	LERF	*(hydrofoil boats)* Horizontal distance of centre of pressure of rear foil to centre of gravity		m
l_{r}	LHRD	*(ships, manoeuvrability, turning circles)* Loop height of r-δ curve for unstable ship		rad/s
l_{s}		*(seakeeping, large amplitude motions capsizing)* Actual length of enclosed superstructure extending from side to side of the vessel		m
l_{w}		*(seakeeping, large amplitude motions capsizing)* Wind heeling lever		m
l_{δ}	LWRD	*(ships, manoeuvrability, turning circles)* Loop width of r-δ curve for unstable ship		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit

M	M1, F1	*(ships, basic quantities)* Moment of forces	First order moment of a force distribution	Nm
M	MO	*(ships, basic quantities)* Momentum		Ns
M	MR	(*fundamental, statistical, stochastic*) Expectation, population mean		
M		*(ships, hydrostatics, stability) (seakeeping, large amplitude motions capsizing)* Metacentre of a vessel	See subscripts for qualification	Nm
M,	M,	*(solid body mechanics, loads)* Moment around body axis y		
M	MY	*(ships, manoeuvrability, seakeeping)* Pitch moment on body, moment about body y-axis		Nm
M	MSP	*(hydrofoil boats)* Vessel pitching moment		Nm
M	MS	*(hull geometry)* Midships		
Ma	MN	*(fluid mechanics, flow parameter)* Mach number	V / c	1
$M^{B}{}_{i}$	MB(I)	*(solid body mechanics, loads)* Bending moment	$F^{S1}{}_{2}$, $F^{S1}{}_{3}$	Nm
M^{C}	CIRCM	*(ships, hull geometry)* R.E. Froude's length coefficient, or length-displacement ratio	$L / \nabla^{1/3}$	1
M_{C}		*(seakeeping, large amplitude motions capsizing)* Maximum offset load moment due to crew		Nm
M_{c}		*(seakeeping, large amplitude motions capsizing)* Minimum capsizing moment as determined when account is taken of rolling		Nm
M_{F}	MLF	*(hydrofoil boats)* Load factor of front foil	L_{FF} / Δ	1
M_{FS}		*(seakeeping, large amplitude motions capsizing)* Free surface moment at any inclination		Nm
M_{i}	M(I)	*(ships, unsteady propeller forces)* Vibratory moment	i = 1, 2, 3	Nm

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
M_{L}	MB(3), FS(6)	*(ships, seakeeping)* Wave excited lateral bending moment	Alias horizontal!	Nm
$\overline{M}_{is}$		*(ships, hull resistance, water jets)* Momentum flux at station *s* in *i* direction	$\iint_{A_s} \rho u_i \left(u_j n_j\right) dA$	W
M_{N}	MB(2), FS(5)	*(ships, seakeeping)* Wave excited normal bending moment	Alias vertical!	Nm
M, MR	MR	(*fundamental, statistical, stochastic*) Expectation, population mean		
M_{R}	MLR	*(hydrofoil boats)* Load factor of rear foil	L_{FR} / Δ	1
M_{R}		*(seakeeping, large amplitude motions capsizing)* Heeling moment due to turning		Nm
M_{S}	MS	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* 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	Nm
MS	MS	(*fundamental, statistical, stochastic*) Average, sample mean		1
M_{T}	MT(1), FS(4)	*(ships, seakeeping)* Wave excited torsional moment		Nm
M^{T}	MT, MB(1)	*(solid body mechanics, loads)* Twisting or torsional moment	$F^{\mathrm{S1}}{}_{1}$	Nm
M_{TC}	MTC	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Moment to change trim by one centimetre		Nm/cm
M_{TM}	MTM	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Moment to change trim by one meter	ΔC_{MTL}	Nm/m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
M_{uv}	MA(U,V)	*(ships, unsteady propeller forces, solid body mechanics, inertial and hydro properties)* Generalized mass, i. e. generalized inertia tensor of a (rigid) body referred to a body fixed coordinate system	$M_{ij} = M^0_{ij}$ $M_{i,\,3+j} = M^{1T}_{ij}$ $M_{3+i,\,j} = M^1_{ij}$ $M_{3+i\,,\,3+j} = M^2_{ij}$	kg
M_{W}		*(seakeeping, large amplitude motions capsizing)* Maximum heeling moment due to wind		Nm
M_{v}		*(seakeeping, large amplitude motions capsizing)* Dynamically applied heeling moment due to wind pressure		Nm
M_{x} ,	M(1),	*(solid body mechanics, loads)* Moment around body axis *x*		Nm
M_{y} ,	M, M(2),	*(solid body mechanics, loads)* Moment around body axis *y*		Nm
M_{z} ,	M(3)	*(solid body mechanics, loads)* Moment around body axis *z*		Nm
m	M, MA, MASS	*(ships, basic quantities, solid body mechanics, inertial and hydro properties)* Mass		kg
m	XACB	*(ships, hydrostatics, stability)* Longitudinal centre of floatation of added buoyant layer	Longitudinal distance from reference point to the centre of the added buoyant layer, b	m
m	SHIPMA	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Ship mass	W / g	kg
m	BLCK	*(ships, hull resistance)* Blockage parameter	Maximum transverse area of model ship divided by tank cross section area	1
m^0_{ij} , m_{ij}	M0(I,J), MA(I,J)	*(solid body mechanics, inertial and hydro properties)* Zeroth moments of mass, i.e. inertia distribution, mass tensor	$m_{ij} = m\,\delta_{ij}$	kg

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
m^1_{ij}	M1(I,J)	*(solid body mechanics, inertial and hydro properties)* First moments of mass, i.e. inertia distribution	Alias static moments of mass	kg m
m^2_{22} , m_{55}	M2(2,2), MA(5,5)	*(solid body mechanics, inertial and hydro properties)* Pitch moment of inertia around the principal axis y		kg m^2
m^2_{33} , m_{66}	M2(3,3), MA(6,6)	*(solid body mechanics, inertial and hydro properties)* Yaw moment of inertia around the principal axis z		kg m^2
m^2_{ij} ,	M2(I,J),	*(solid body mechanics, inertial and hydro properties)* Second moments of mass, i.e. inertia distribution	Alias mass moments of inertia	kg m^2
m_{LCC}		*(seakeeping, large amplitude motions capsizing)* Mass in light craft condition		kg
m_{LDC}		*(seakeeping, large amplitude motions capsizing)* Mass in loaded displacement condition according to …		kg
m_{MTL}		*(seakeeping, large amplitude motions capsizing)* Maximum total load (mass)		kg
m_n	MN	*(environmental mechanics, waves)* n-th moment of wave power spectral density	$\int f^n S(f)df$	m^2/ s^n
m_{SSC}		*(seakeeping, large amplitude motions capsizing)* Mass in standard sailing conditions according to …		kg
m_x	*X*MS	(*fundamental, statistical*) Average or sample mean of a random quantity	$1/n\ \Sigma\ x_i$, i = 1...n unbiased random estimate of the expectation with $x^{\mathrm{AE}} = x^{\mathrm{E}}$ $x^{\mathrm{VSE}} = x^{\mathrm{V}} / n$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
N	FR, N	*(ships, basic quantities)* Frequency or rate of revolution	Alias RPS (RPM in some propulsor applications)	Hz
N		*(uncertainty)* Number of input quantities	Number of input quantities X_i on which the measurand Y depends	1
N	MZ	*(ships, manoeuvrability, seakeeping)* Yaw moment on body, moment about body z-axis		Nm
N	N, M(3), F1(3), F(6)	*(solid body mechanics, loads)* Moment around body axis z		Nm
N_{A}	NAPP	*(planing, semi-displacement vessels)* Appendage lift force (normal to reference line)	Lift forces arising from appendages inclined to flow, assumed to act normally to reference line	N
N_{B}	NBOT	*(planing, semi-displacement vessels)* Bottom normal force (normal to reference line)	Resultant of pressure and buoyant forces assumed acting normally to the reference line	N
N_{P}	NPR	*(ships, propulsor geometry)* Number of propellers		1
N_{PP}	NPP	*(planing, semi-displacement vessels)* Propeller pressure force (normal to reference line)	Resultant of propeller pressure forces acting normally to the reference line	N
N_{PS}	NPS	*(planing, semi-displacement vessels)* Propeller suction force (normal to reference line)	Resultant of propeller suction forces acting normally to the reference line	N
N_r	NR	*(ships, manoeuvrability, seakeeping)* Derivative of yaw moment with respect to yaw velocity	$\partial N / \partial r$	Nms
$N_{\dot{r}}$	NRRT	*(ships, manoeuvrability, seakeeping)* Derivative of yaw moment with respect to yaw acceleration	$\partial N / \partial \dot{r}$	Nms^2
NVR		*(ships, hull resistance, water jets)* Nozzle velocity ratio:	$\dfrac{\overline{u_{6\xi}}}{U_0}$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
N_v	NV	*(ships, manoeuvrability, seakeeping)* Derivative of yaw moment with respect to sway velocity	$\partial N / \partial v$	Ns
$N_{\dot{v}}$	NVRT	*(ships, manoeuvrability, seakeeping)* Derivative of yaw moment with respect to sway acceleration	$\partial N / \partial \dot{v}$	Nms^2
N_δ	ND	*(ships, manoeuvrability, seakeeping)* Derivative of yaw moment with respect to rudder angle	$\partial N / \partial \delta$	Nm
n		Number of repeated observations		1
n	FR, N	*(ships, basic quantities, performance, propulsor performance)* Frequency or rate of revolution	Alias RPS (RPM in some propulsor applications)	Hz
n		*(ships, hull resistance, water jets)* Impeller rotation rate		Hz
n_{AW}	NAW	*(ships, seakeeping)* Mean increased rate of revolution in waves		$1/s^2$
n_i		*(ships, hull resistance, water jets)* Unit normal vector in *i* direction		1
n_{IA}	FRICMS	*(ice going vessels)* Average rate of propeller revolution in ice		Hz

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$\overline{OG}$		*(seakeeping, large amplitude motions capsizing)* Height of centre of gravity above waterline		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
P	P, PO	*(ships, basic quantities)* Power		W
P	PT	*(fluid mechanics, boundary layers)* Total pressure		Pa
P	PITCH	*(ships, propulsor geometry)* Propeller pitch in general		m
P	P	*(sailing vessels)* Mainsail height		m
P_{AW}	PAW	*(ships, seakeeping)* Mean power increased in waves		W
P_{B}	PB	*(ships, performance)* Brake power	Power delivered by prime mover	W
PD	PD	(*fundamental, statistical, stochastic*) Probability density		1
P_{D}	PD, PP	*(ships, performance)* Delivered power, propeller power	$Q\ \omega$	W
P_{D}		*(ships, hull resistance, water jets)* Delivered Power to pump impeller		W
P_{DI}	PDI	*(ice going vessels)* Delivered power at propeller in ice	$2\ \pi\ Q_{\mathrm{IA}}\ n_{\mathrm{IA}}$	W
P_{E}	PE, PR	*(ships, performance)* Effective power, resistance power	$R\ V$	W
P_{E}		*(ships, hull resistance, water jets)* Effective power:	$R_{\mathrm{TBH}} U_0$	W
$\mathrm{P_F}$	PF	(*fundamental, statistical, stochastic*) Probability function		1
P_{FCU}	PFCU	*(ACV and SES)* Power of lift fan		W
P_{FSK}	PFSK	*(ACV and SES)* Power of skirt fan		W
P_{I}	PI	*(ships, performance)* Indicated power	Determined from pressure measured by indicator	W
P_{J}	PJ	*(ships, propulsor performance)* Propeller jet power	$\eta_{\mathrm{TJ}}\ T\ V_{\mathrm{A}}$	W
P_{JSE}		*(ships, hull resistance, water jets)* Effective Jet System Power	$Q_{\mathrm{J}} H_{1\mathrm{A}7}$	W
P_m	PM	*(propulsion, propulsor)* Propeller mean pitch		m
P_{MB}	PMB	*(propulsion, propulsor)* Blade mean pitch		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
P_n	PN	*(ships, manoeuvrability, seakeeping)* P-number, heading change per unit rudder angle in one ship length		1
P_P	PD, PP	*(ships, performance)* Delivered power, propeller power	$Q\ \omega$	W
P_PE		*(ships, hull resistance, water jets)* Pump effective power:	$Q_\mathrm{J} H_{35}$	W
P_R	PE, PR	*(ships, performance)* Effective power, resistance power	$R\ V$	W
P_S	PS	*(ships, performance)* Shaft power	Power measured on the shaft	W
P_T	PTH	*(ships, performance)* Thrust power	$T\ V_\mathrm{A}$	W
P_TE		*(ships, hull resistance, water jets)* Effective thrust power		W
P_V		*(seakeeping, large amplitude motions capsizing)* Wind pressure		Pa
p		*(uncertainty)* Probability	Level of confidence: $0 \le p \le 1.0$	1
p	P	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis x		rad/s
p	PR, ES	*(fluid mechanics, flow fields)* Pressure, density of static flow energy		Pa
p	PR	*(fluid mechanics, boundary layers)* Static pressure		Pa
p	PDR	*(ships, propulsor geometry)* Pitch ratio ISO Symbol: P/D	$P\ /\ D$	1
p	PR	*(ships, unsteady propeller forces)* Pressure		Pa
p	OX, P	*(ships, manoeuvrability)* Roll velocity, rotational velocity about body x-axis		1/s
p_0	P0	*(fluid mechanics, flow fields)* Ambient pressure in undisturbed flow		Pa
p_0	PR0	*(ships, hull resistance, water jets)* Ambient pressure in undisturbed flow		N/m²

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
p_A	PA	*(fluid mechanics, cavitation)* Ambient pressure		Pa
p_{AC}	PACO	*(fluid mechanics, cavitation)* Collapse pressure	Absolute ambient pressure at which cavities collapse	Pa
p_{AI}	PAIC	*(fluid mechanics, cavitation)* Critical pressure	Absolute ambient pressure at which cavitation inception takes place	Pa
p_B	PBM	*(ACV and SES)* Mean bag pressure		Pa
p_{BS}	PBS	*(ACV and SES)* Bow seal pressure	Pressure in the bow seal bag	Pa
p_C	PC	*(fluid mechanics, cavitation)* Cavity pressure	Pressure within a steady or quasi-steady cavity	Pa
p_{CI}	PCIN	*(fluid mechanics, cavitation)* Initial cavity pressure	Pressure, may be negative, i. e. tensile strength, necessary to create a cavity	Pa
p_{CE}	PCE	*(ACV and SES)* Mean effective skirt pressure		Pa
p_{CU}	PCU	*(ACV and SES)* Cushion pressure	Mean pressure in the cushion	Pa
p_{FT}	PFT	*(ACV and SES)* Fan total pressure		Pa
p_{LR}	PLR	*(ACV and SES)* Cushion pressure to length ratio	P_{CU} / L_C	Pa/m
p_s		*(ships, hull resistance, water jets)* Local static pressure at station *s*		Pa
p_{SK}	PSK	*(ACV and SES)* Skirt pressure in general		Pa
p_{SS}	PSS	*(ACV and SES)* Stern seal pressure	Pressure in the stern seal bag	Pa
p_V	PV	*(fluid mechanics, cavitation)* Vapour pressure of water	At a given temperature!	Pa
$\dot{p}$	PR	*(solid body mechanics, rigid body motions)* Rates of change of components of rotational velocity relative to body axes		rad/s^2
$\dot{p}$	OXRT, PR	*(ships, manoeuvrability)* Roll acceleration, angular acceleration about body x-axis	dp / dt	1/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Q	Q	*(ships, performance)* Torque	P_D / ω	Nm
Q		(*fundamental, balances and system related*) Quantity under consideration		Q^U/s
Q	QF, QFLOW	*(fluid mechanics, flow fields)* Rate of flow	Volume passing across a control surface in time unit	m^3/s
Q	QF	*(fluid mechanics, boundary layers)* Entrainment	$\int_a^b U\, dy$	m^2/s
Q		*(ships, hull resistance, water jets)* Impeller torque		Nm
Q_{AW}	QAW	*(ships, seakeeping)* Mean torque increased in waves		Nm
Q_{BS}	QBS	*(ACV and SES)* Bow seal air flow rate	Air flow rate to the bow seal	m^3/s
Q_{bl}		*(ships, hull resistance, water jets)* Volume flow rate inside boundary layer		m^3/s
Q^C	QCF	(*fundamental, balances and system related*) Convective flux		Q^U/s
Q_{CU}	QCU	*(ACV and SES)* Cushion air flow rate	Air flow rate to cushion	m^3/s
Q^D	QDF	(*fundamental, balances and system related*) Diffusive flux		Q^U/s
Q^F	QFL	(*fundamental, balances and system related*) Total flux across the surface of the control volume	Inward positive!	Q^U/s
Q_{FB}	QFB	*(ships, manoeuvrability, seakeeping)* Torque of bow fin		Nm
Q_{FS}	QFS	*(ships, manoeuvrability, seakeeping)* Torque of stern fin		Nm
Q_{IA}	QIMS	*(ice going vessels)* Average torque in ice		Nm
Q_J		*(ships, hull resistance, water jets)* Volume flow rate through water jet system		m^3/s
Q^M	QDM	(*fundamental, balances and system related*) Molecular diffusion		Q^U/s
Q^P	QPN	(*fundamental, balances and system related*) Production of sources in the control volume		Q^U/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Q_R	QRU	*(ships, manoeuvrability, seakeeping)* Torque about rudder stock		Nm
Q_S	QSP	*(ships, propulsor performance)* Spindle torque	About spindle axis of controllable pitch propeller $Q_S = Q_{SC} + Q_{SH}$ positive if it increases pitch	Nm
Q^S	*Q*RT	(*fundamental, balances and system related*) Storage in the control volume, rate of change of the quantity stored	dq / dt	Q^U/s
Q_{SC}	QSPC	*(ships, propulsor performance)* Centrifugal spindle torque		Nm
Q_{SH}	QSPH	*(ships, propulsor performance)* Hydrodynamic spindle torque		Nm
Q_{SS}	QSS	*(ACV and SES)* Stern seal air flow rate	Air flow rate to the stern seal	m^3/s
Q_T	QT	*(ACV and SES)* Total air volume flow		m^3/s
Q^T	*Q*DT	(*fundamental, balances and system related*) Turbulent diffusion		Q^U/s
Q_{TS}	QTS	*(ACV and SES)* Total air volume flow of skirt		m^3/s
q		*(uncertainty)* Random quantity		1
$\overline{q}$		*(uncertainty)* Arithmetic mean or average		1
q	QQ	(*fundamental, balances and system related*) Quantity of the quality under consideration stored in a control volume		Q^U
q	UNQ	*(solid body mechanics, loads)* Load per unit length		N/m
q	Q	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis *y*		rad/s
q	PD, EK	*(fluid mechanics, flow fields)* Dynamic pressure, density of kinetic flow energy,	$\rho\ V^2 / 2$	Pa
q	PD, EK	*(ships, hull resistance)* Dynamic pressure, density of kinetic flow energy,	$\rho\ V^2 / 2$ see 3.3.2	Pa

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
q	OY, Q	*(ships, manoeuvrability)* Pitch velocity, rotational velocity about body y-axis		1/s
$\dot{q}$	QR	Rates of change of components of rotational velocity relative to body axes		rad/s^2
q_A	QA	*(ships, propulsor performance)* Dynamic pressure based on advance speed	$\rho\ V_A^2 / 2$	Pa
q_k		*(uncertainty)* kth observation of q	k^{th} independent repeated observation of randomly varying quantity q	1
q_R	PDWR, EKWR	*(ships, hull resistance)* Dynamic pressure based on apparent wind	$\rho\ V_{WR}^2/ 2$ see 3.4.2	Pa
q_S	QS	*(ships, propulsor performance)* Dynamic pressure based on section advance speed	$\rho\ V_S^2 / 2$	Pa
$\dot{q}$	OYRT, QR	*(ships, manoeuvrability)* Pitch acceleration, angular acceleration about body y-axis	dq / dt	1/s^2
$\dot{q}$	QR	*(solid body mechanics, rigid body motions)* Rates of change of components of rotational velocity relative to body axes		rad/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
R	R	(*fundamental, time and frequency domain quantity*) Complex variable	exp($s\ T_S$) Laurent transform	
R	R, RE	*(ships, basic quantities)* Resistance (force)	Force opposing translatory velocity	N
R	RD	*(ships, basic quantities)* Radius		m
R	RDP	*(ships, propulsor geometry)* Propeller radius		m
R_A	RA	*(ships, hull resistance)* Model-ship correlation allowance	Incremental resistance to be added to the smooth ship resistance to complete the model-ship prediction	N
R_{AA}	RAA	*(ships, hull resistance)* Air or wind resistance		N
R_{APP}	RAP	*(ships, hull resistance)* Appendage resistance		N
R_{AR}	RAR	*(ships, hull resistance)* Roughness resistance		N
R_{ASK}	RASK	*(ACV and SES)* Intake momentum resistance of skirt	$\rho_A\ Q_{TS}\ V_A$	N
R_{AW}	RAW	*(ships, seakeeping, sailing vessels)* Mean added resistance in waves		N
R_{AT}	RAT	*(ACV and SES)* Total aerodynamic resistance	$R_M + R_0$	N
R_C	RC	*(ships, hull resistance)* Resistance corrected for difference in temperature between resistance and self-propulsion tests	$R_{TM}[(1 + k)\ C_{FMC} + C_R] / [(1 + k)\ C_{FM} + C_R]$ where C_{FMC} is the frictional coefficient at the temperature of the self-propulsion test	N
R_C	RCS	*(ships, manoeuvrability, turning circles)* Steady turning radius		m
Re	RN	*(fluid mechanics, flow parameter)* Reynolds number	$V\ L\ /\ \nu$	1
$Re_{0.7}$	RN07	*(fluid mechanics, flow parameter)* Propeller Reynolds number at 0.7 R	$Re_{0.7} = \dfrac{c_{0.7}\sqrt{V_A^2 + (0.7\pi nD)^2}}{\nu}$	1
Re_{δ^*}	RDELS	*(fluid mechanics, boundary layers)* Reynolds number based on displacement thickness	$U_\infty\ \delta^* / \nu$ or $U_e\ \delta^* / \nu$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Re_θ	RTHETA	*(fluid mechanics, boundary layers)* Reynolds number based on momentum thickness	$U_\infty \Theta / \nu$ or $U_e \Theta / \nu$	1
R_F	RF	*(ships, hull resistance)* Frictional resistance of a body	Due to fluid friction on the surface of the body	N
R_{F0}	RF0	*(ships, hull resistance)* Frictional resistance of a flat plate		N
R_{FINT}	RFINT	*(multi-hull vessels)* Frictional resistance interference correction	$R_{FMH} - \Sigma R_F$	N
R_{FMH}	RFMH	*(multi-hull vessels)* Frictional resistance of multi-hull vessel		N
R_{FU}		*(sailing vessels)* Friction resistance (upright)		N
R_H	RH	*(ACV and SES)* Hydrodynamic resistance	$R_W + R_{WET}$	N
R_H	RH	*(fluid mechanics, flow parameter)* Hydraulic radius	Area of section divided by wetted perimeter	m
R_H	RTUHA	*(sailing vessels)* Resistance increase due to heel (with zero side force)		N
R_I		*(sailing vessels)* Resistance increase due to side (induced resistance)		N
R_I	RI	*(ice going vessels)* Net ice resistance	$R_{IT} - R_{IW}$	N
R_{IT}	RIT	*(ice going vessels)* Total resistance in ice	Ship towing resistance in ice	N
R_{IW}	RIW	*(ice going vessels)* Hydrodynamic resistance in presence of ice	Total water resistance of ship in ice	N
R_k	RAKG	*(ships, propulsor geometry)* Rake	The displacement from the propeller plane to the generator line in the direction of the shaft axis. Aft displacement is positive rake.	m
R_K	RKEEL	*(planing, semi-displacement vessels)* Keel drag		N
R_M	RM	*(ACV and SES)* Intake momentum resistance in general	$\rho_A Q_T V_A$	N
R_{MCU}	RMCU	*(ACV and SES)* Intake momentum resistance of cushion	$\rho_A Q_{CU} V_A$	N

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
R_P	RP	*(ships, hull resistance)* Pressure resistance	Due to the normal stresses over the surface of a body	N
R_{PAR}	RPAR	*(planing, semi-displacement vessels)* Parasitic drag	Drag due to inlet and outlet openings	N
R_{PS}	RSP	*(planing, semi-displacement vessels)* Pressure component of spray drag		N
R_{PV}	RPV	*(ships, hull resistance)* Viscous pressure resistance	Due to normal stress related to viscosity and turbulence	N
RR	RR	(*fundamental, statistical, stochastic*) Population correlation		
R_R	RR	*(ships, hull resistance)* Residuary resistance	R_T - R_F or R_T - R_{F0}	N
R_{RBH}	RRBH	*(ships, hull resistance)* Residuary resistance of the bare hull		N
R_{RI}	RRINT	*(multi-hull vessels)* Residuary resistance interference correction	$R_{RMH} - \Sigma R_R$	N
R_{RMH}	RRMH	*(multi-hull vessels)* Residuary resistance correction of multi-hull	$R_{TMH} - R_{FMH}$	N
R_{RU}		*(sailing vessels)* Residuary resistance (upright)		N
R_S	RS	*(ships, hull resistance)* Spray resistance	Due to generation of spray	N
RS	RS	(*fundamental, statistical, stochastic*) Sample correlation		
R_{SI}	RSI	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Required subdivision index		1
R_T	RT	*(planing, semi-displacement vessels)* Total resistance	Total towed resistance	N
R_{TBH}	RTBH	*(ships, hull resistance, water jets)* Total resistance of bare hull		N
R_{TI}	RTINT	*(multi-hull vessels)* Total resistance interference correction	$R_{TMH} - \Sigma R_T$	N
R_{TMH}	RTMH	*(multi-hull vessels)* Total resistance of multi-hull vessel		N
R_{TU}	RTU	*(sailing vessels)* Total resistance (upright)		N

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$R_{T\varphi}$	RTUH	*(sailing vessels)* Total resistance when heeled	$R_{TU} + R_{\varphi}$	N
R_U	RU	*(ships, propulsor performance)* Pod unit resistance	Resistance of a podded drive unit	N
R_u	R(U)	*(ships, unsteady propeller forces)* Generalized vibratory bearing reaction	u = 1,.., 6 u = 1, 2, 3: force u = 4, 5, 6: moment	N N Nm
R_V	RV	*(ships, hull resistance)* Total viscous resistance	$R_F + R_{PV}$	N
R_{VS}	RSV	*(planing, semi-displacement vessels)* Viscous component of spray drag	$C_F\ S_{WS}\ q_S$	N
R_W	RW	*(ships, hull resistance)* Wave making resistance	Due to formation of surface waves	N
R_{WB}	RWB	*(ships, hull resistance)* Wave breaking resistance	Associated with the break down of the bow wave	N
R_{WET}	RWET	*(ACV and SES)* Resistance due to wetting		N
R_{WP}	RWP	*(ships, hull resistance)* Wave pattern resistance		N
R_{xx}	*XX*RR	(*fundamental, statistical, stochastic*) Auto-correlation of a stationary stochastic process	$x(t)x(t+\tau)^E = R_{xx}(\tau)$ $R_{xx}(\tau) = R_{xx}(-\tau)$ if x is ergodic: $R_{xx}(\tau) = x(t)x(t+\tau)^{MR}$ $R_{xx}(\tau) = \int S_{xx}(\omega)\cos(\omega\tau)d\tau$ $\tau = 0 \ldots \infty$	xx^R, xx^{RR}, R_{xx}
R_{xx}	*XX*MR	(*fundamental, statistical*) Auto-correlation of a random quantity	$x\ x^E$	
R_{xy}	*XY*RR	(*fundamental, statistical, stochastic*) Cross-correlation of two stationary stochastic processes	$x(t)y(t+\tau)^E = R_{xy}(\tau)$ $R_{yx}(\tau) = R_{xy}(-\tau)$ if x, y are ergodic: $R_{xy}(\tau) = x(t)y(t+\tau)^{MR}$	xy^R, R_{xy}
R_{xy}	*XY*MR	(*fundamental, statistical*) Cross-correlation of two random quantities	$x\ y^E$	
R_{π}	RPI	*(planing, semi-displacement vessels)* Induced drag	$g\ \rho\ \nabla tg\ \tau$	N
R_{φ}	RTUHA	*(sailing vessels)* Resistance increase due to heel (with zero side force)		N
r	R	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis z		rad/s
r	RD	*(ships, basic quantities)* Radius		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
r	LR	*(ships, propulsor geometry)* Blade section radius		m
r	OZ, R	*(ships, manoeuvrability)* Yaw velocity, rotational velocity about body z-axis		1/s
$r(x_i,x_j)$		*(uncertainty)* Estimated correlation coefficient	$r(x_i, x_j) = u(x_i, x_j)/(u(x_i)\, u(x_j))$	1
r	R	*(ships, unsteady propeller forces)* Cylindrical coordinates	Cylindrical system with origin O and longitudinal x-axis as defined before; angular a-(attitude)-coordinate , zero at 12 o'clock position, positive clockwise looking forward, r distance measured from the x-axis	m
r		*(seakeeping, large amplitude motions capsizing)* Effective wave slope coefficient		1
r_C	OZCI	*(ships, manoeuvrability, turning circles)* Steady turning rate		1/s
$r_C{}'$	OZCINO	*(ships, manoeuvrability, turning circles)* Non-dimensional steady turning rate	$r_C\, L_{PP} / U_C$ or $2\, L_{PP} / D_C$	m
r_h	RH	*(ships, propulsor geometry)* Hub radius		m
$\dot{r}$	RR	*(solid body mechanics, rigid body motions)* Rates of change of components of rotational velocity relative to body axes		rad/s^2
$\dot{r}$	OZRT, RR	*(ships, manoeuvrability)* Yaw acceleration, angular acceleration about body z-axis	dr / dt	1/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
S	S, AWS	*(ships, hull geometry)* Area of wetted surface		m^2
S	S	*(ships, hull resistance)* Wetted surface area, underway	$S_{\mathrm{BH}} + S_{\mathrm{APP}}$	m^2
S_0	S0	*(ships, hull resistance)* Wetted surface area, at rest	$S_{\mathrm{BH0}} + S_{\mathrm{APP0}}$	m^2
S^0_{ij}	SM0(I,J)	Zero$^{\mathrm{th}}$ order moment of a scalar quantity	$\int \delta_{ij} ds = \delta_{ij} S$	
S^1_{ij}	SM1(I,J)	(*fundamental. coordinate and space related*) First order moment of a scalar quantity, formerly static moments of a scalar distribution	$\int \varepsilon_{ikj} x_k ds$	
S^2_{ij}	SM2(I,J)	(*fundamental. coordinate and space related*) Second moment of a scalar quantity, formerly moments of inertia of a scalar distribution	$\int \varepsilon_{kli} x_l \varepsilon_{jkm} x_m ds$	
S_{A}	SRA	*(ships, propulsor performance)* Apparent slip ratio	$1 - V / (n P)$	1
S_A	AS	*(sailing vessels)* Sail area in general	$(P E + I J) / 2$	m^2
S_{APP}	SAP	*(ships, hull resistance)* Appendage wetted surface area, underway		m^2
S_{APP0}	SAP0	*(ships, hull resistance)* Appendage wetted surface area, at rest		m^2
S_{BH}	SBH	*(ships, hull resistance)* Bare Hull wetted surface area, underway		m^2
S_{BH0}	SBH0	*(ships, hull resistance)* Bare Hull wetted surface area, at rest		m^2
S^C	CIRCS	*(ships, hull geometry, hull resistance)* R.E. Froude's wetted surface area coefficient	$S / \nabla^{2/3}$	1
S_{C}	SC	*(sailing vessels)* Wetted surface area of canoe body		m^2
S_{H}	THL	*(fluid mechanics, flow fields)* Total head loss		m
S_{H0}	SSH0	*(ACV and SES)* Wetted area of side hulls at rest off cushion	Total wetted area of side walls under way on cushion	m^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
S_I	SAIC	*(environmental mechanics, ice)* Salinity of ice	Weight of salt per unit weight of ice	1
$S_i(f)$, $S_i(\omega)$	EISF, EISC	*(environmental mechanics, waves)* Incident wave power spectral density		m^2/Hz
S_K	SK	*(sailing vessels)* Wetted surface area of keel		m^2
$S_\eta(f)$, $S_{\eta\eta}(f)$, $S_\eta(\omega)$, $S_{\eta\eta}(\omega)$	EWSF, EWSC	*(ships, seakeeping)* Wave elevation auto spectral density		m^2s
$S_\eta(f)$, $S_\eta(\omega)$	EWSF, EWSC	*(environmental mechanics, waves)* Wave power spectral density		m^2/Hz
S_R	SRR	*(ships, propulsor performance)* Real slip ratio	$1 - V_A / (n\ P)$	1
S_R	SR	*(sailing vessels)* Wetted surface area of rudder		m^2
$S_r(f)$, $S_r(\omega)$	ERSF, ERSC	*(environmental mechanics, waves)* Reflected wave power spectral density		m^2/Hz
S_S	SWS	*(planing, semi-displacement vessels)* Area wetted by spray	Wetted area between design line or stagnation line and spray edge	m^2
S_SHC	SSHC	*(ACV and SES)* Wetted area of side hulls under way on cushion	Total wetted area of side walls under way on cushion	m^2
S_SH	SSH	*(ACV and SES)* Wetted area of side hulls under way off cushion	Total wetted area of side walls under way off cushion	m^2
St	SN	*(fluid mechanics, flow parameter)* Strouhal number	$f\ L / V$	1
STIX	STIX	*(seakeeping, large amplitude motions capsizing)* Actual stability index value according to …		1
$\overline{\underline{STIX}}$	STIXR	*(seakeeping, large amplitude motions capsizing)* Required stability index value, see …		1
S_{uv}	*S*(U,V)	(*fundamental. coordinate and space related*) Generalized moment of a scalar quantity distributed in space	$S_{ij} = S^0_{ij}$ $S_{i,3+j} = S^1_{ij}{}^T$ $S_{3+i,j} = S^1_{ij}$ $S_{3+i,3+j} = S^2_{ij}$	
S_W	SAWA	*(environmental mechanics, ice)* Salinity of water	Weight of dissolved salt per unit weight of saline water	1
S_WB	SWB	*(planing, semi-displacement vessels)* Wetted bottom area, underway	Area bounded by stagnation line, chines or water surface underway and transom	m^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
S_{WBK}	SWBK	Wetted surface area of bilge keels		m^2
S_{WHP}	SWHP	*(planing, semi-displacement vessels)* Wetted area underway of planing hull	Principal wetted area bounded by trailing edge, chines and spray root line	m^2
S_{WHE}	SWHE	*(planing, semi-displacement vessels)* Wetted hull area, underway	Total wetted surface of hull underway, including spray area and wetted side area, w/o wetted transom area	m^2
S_{WHS}	SWSH	*(planing, semi-displacement vessels)* Area of wetted sides	Wetted area of the hull side above the chine or the design water line	m^2
S_{WS}	SWS	*(planing, semi-displacement vessels)* Area wetted by spray	Wetted area between design line or stagnation line and spray edge	m^2
S_{xx}	*XX*SR	(*fundamental, statistical, stochastic*) Power spectrum or autospectral power density of a stochastic process	xx^{RRSR}	
S_{xy}	*XY*SR	(*fundamental, statistical, stochastic*) Cross-power spectrum of two stationary stochastic processes	xy^{RRSR}	
$S_{\zeta}(\omega,\mu)$ $S_{\theta}(\omega,\mu)$ etc.	S2ZET S2TET etc.	*(environmental mechanics, waves)* Two dimensional spectral density		1
$S_{\rho}(f,\theta)$ $S_{\zeta}(\omega,\mu)$	STHETA	*(environmental mechanics, waves)* Directional spectral density		m^2/Hz/ rad
s	*S*	(*fundamental. coordinate and space related*) Any scalar quantity distributed, maybe singularly, in space	$\int ds$	
s	S	(*fundamental, time and frequency domain quantity*) Complex variable	$a + 2\pi i f$ Laplace transform	1/s
s	SP	*(ships, basic quantities)* Distance along path		m
s		*(seakeeping, large amplitude motions capsizing)* Wave steepness		1
s_F	SPF	*(ships, manoeuvrability, stopping man.)* Distance along track, track reach		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
s_{ij}	ST(I,J)	*(fluid mechanics, flow fields)* Total stress tensor	Density of total diffusive momentum flux due to molecular and turbulent exchange	Pa
s^{V}_{ij}	SV(I,J)	*(fluid mechanics, flow fields)* Viscous stress		Pa
s_{p}		*(uncertainty)* Pooled experimental standard deviation	Positive square root of s_{p}^{2}	
s_{p}^{2}		*(uncertainty)* Pooled estimate of variance		1
$s^{2}(\overline{q})$		*(uncertainty)* Experimental variance of the mean	$s^{2}(\overline{q}) = s^{2}(q_{k})/n$; estimated variance obtained from a Type A evaluation	1
$s(\overline{q})$		*(uncertainty)* Experimental standard deviation of the mean	Positive square root of $s^{2}(\overline{q})$	1
$s^{2}(q_{k})$		*(uncertainty)* Experimental variance from repeated observations		1
$s(q_{k})$		*(uncertainty)* Experimental standard deviation of repeated observations	Positive square root of $s^{2}(q_{k})$	1
s^{R}_{ij}	SR(I,J)	Turbulent or Reynolds stress	$\rho\ v_{i}v_{j}^{CR}$	Pa
$s^{2}(\overline{X}_{i})$		*(uncertainty)* Experimental variance of input mean	From mean $\overline{X}_{i}$, determined from *n* independent repeated observations $X_{i,k}$, estimated variance obtained from a Type A evaluation.	1
$s(\overline{X}_{i})$		*(uncertainty)* Standard deviation of input mean	Positive square root of $s^{2}(\overline{X}_{1})$	1
$s(\overline{q},\overline{r})$		*(uncertainty)* Estimate of covariance of means		1
$s(\overline{X}_{i},\overline{X}_{j})$		*(uncertainty)* Estimate of covariance of input means		1
s_{V}	SINKV	*(ships, performance)* Sinkage, dynamic	Change of draft, fore and aft, divided by length	1
s_{x}	*X*DS	(*fundamental, statistical*) Sample deviation of a random quantity	$x^{VS\ 1/2}$, unbiased random estimate of the standard deviation	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
T	T	*(ships, hull geometry, seakeeping, large amplitude motions capsizing)* Draught, moulded, of ship hull		m
T	TC	*(ships, basic quantities, ships, seakeeping)* Period, Wave period	Duration of a cycle of a repeating or periodic, not necessarily harmonic process	s
T	TIC	*(ships, manoeuvrability, seakeeping)* Time constant of the 1st order manoeuvring equation		s
T	TH	*(ships, propulsor performance)* Propeller thrust		N
T	YHA	*(seakeeping, large amplitude motions capsizing)* Equivalent transverse heeling arm	Heeling moment/Δ	m
T_{01}	T1	*(environmental mechanics, waves)* Average period from zeroth and first moment	m_0/m_1	s
T_{02}	T2	*(environmental mechanics, waves)* Average period from zeroth and second moment	$(m_0/m_2)^{1/2}$	s
T_1	TIC1	*(ships, manoeuvrability, seakeeping)* First time constant of manoeuvring equation		s
$T_{1/3d}$	T13D	Significant wave period	By downcrossing analysis	s
$T_{1/3u}$	T13U	Significant wave period	By upcrossing analysis	s
T_2	TIC2	*(ships, manoeuvrability, seakeeping)* Second time constant of manoeuvring equation		s
T_3	TIC3	*(ships, manoeuvrability, seakeeping)* Third time constant of manoeuvring equation		s
T_{A}	TA, TAP	*(ships, hull geometry)* Draught at aft perpendicular		m
T_{AD}	TAD, TAPD	*(ships, hull geometry)* Design draught at aft perpendicular		m
T_{AW}	TAW	*(ships, seakeeping)* Mean thrust increase in waves		N
T^{C}	CIRCT	*(ships, hull geometry)* R.E. Froude's draught coefficient	$T/\nabla^{1/3}$	1
T_{C}	TC	(*fundamental, time and frequency domain quantity*) Period of cycle	$1 / f_{\mathrm{C}}$ duration of cycles in periodic, repeating processes	s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
T_C	TC0	*(ACV and SES)* Cushion thrust		N
T_C	TCAN	*(sailing vessels)* Draught of canoe body		m
T_D	THDU	*(ships, propulsor performance)* Duct thrust		N
T_{DP}	THDP	*(ships, propulsor performance)* Ducted propeller thrust		N
T_{DT}	THDT	*(ships, propulsor performance)* Total thrust of a ducted propeller unit		N
T_d	TD	*(environmental mechanics, waves)* Wave periods by zero down-crossing	Time elapsing between two successive downward crossings of zero in a record	s
T_E	TE	*(ships, seakeeping)* Wave encounter period		s
T_{EFF}	TEFF	*(sailing vessels)* Effective draught	$F_H / (\rho V_B^2 R)^5$	m
T_F	TF, TFP	*(ships, hull geometry)* Draught at forward perpendicular		m
T_F	TFO	*(hydrofoil boats)* Foil immersion	Distance between foil chord and mean water surface	m
T_{FD}	TFPD	*(ships, hull geometry)* Design draught at forward perpendicular		m
T_{FD}	TFD	*(hydrofoil boats)* Depth of submergence of apex of a dihedral foil	Distance between foil apex and mean water surface	m
T_{FM}	TFOM	*(hydrofoil boats)* Mean depth of foil submergence		m
T_H	THUL	*(ships, hull geometry)* Draught of the hull	Maximum draught of the hull without keel or skeg	m
Th	TN	*(fluid mechanics, cavitation, fluid mechanics, flow parameter)* Thoma number Cavitation number	$(H_U - p_V / w) / H_N$ $(p_A - p_V)/q$	1
T_{IA}	TIMS	*(ice going vessels)* Average total thrust in ice		N
T_{ij}	T(I,J)	(*fundamental. coordinate and space related*) Tensor in space referred to an orthogonal system of Cartesian coordinates fixed in the body	$T_{ij}^s + T_{ij}^a$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
T_{ij}^{A}	TAS(I,J)	(*fundamental. coordinate and space related*) Anti-symmetric part of a tensor	$(T_{ij} - T_{ji}) / 2$	
T_{ij}^{S}	TSY(I,J)	(*fundamental. coordinate and space related*) Symmetric part of a tensor	$(T_{ij} + T_{ji}) / 2$	
T_{ij}^{T}	TTR(I,J)	(*fundamental. coordinate and space related*) Transposed tensor	T_{ji}	
$T_{ij}\, v_j$		(*fundamental. coordinate and space related*) Tensor product	$\Sigma\, T_{ij}\, v_j$	
T_{jx}	TJX	Jet thrust (can be measured directly in bollard pull condition)		N
TL		*(seakeeping, large amplitude motions capsizing)* Turning lever		1
T_{M}	TM, TMS	*(ships, hull geometry)* Draught at midship	$(T_{\mathrm{A}} + T_{\mathrm{F}}) / 2$ for rigid bodies with straight keel	m
T_{MD}	TMD, TMSD	*(ships, hull geometry)* Design draught at midship	$(T_{\mathrm{AD}} + T_{\mathrm{FD}}) / 2$ for rigid bodies	m
T_{net}		*(ships, hull resistance, water jets)* Net thrust exerted by the jet system on the hull		N
T_P	TP	*(environmental mechanics, waves)* Period with maximum energy	$2\pi f_P$	
T_{PBS}	TPBS	Bottom Thickness of Strut		m
T_{R}	TR	*(environmental mechanics, waves)* Duration of record	$1 / f_{\mathrm{R}}$	s
T_{rt}	TRT	*(environmental mechanics, waves)* Return period	The average interval in years between times that a given design wave is exceeded	
T_{S}	TS	*(fundamental, time and frequency domain quantity, environmental mechanics, waves)* Sample interval, Period of sampling	$1 / f_{\mathrm{S}}$, time between two successive samples, Duration between samples	s
T_{T}	TTR	*(ships, hull geometry)* Immersion of transom	Vertical depth of trailing edge of boat at keel below water surface level	m
T_{U}	TU	*(ships, propulsor performance)* Pod unit thrust, ,	Pod unit resistance subtracted from the propeller thrust	N

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
T_{u}	TU	(environmental mechanics, waves) Wave periods by zero up-crossing	Time elapsing between two successive upward crossings of zero in a record	s
T_{W}	TW	*(environmental mechanics, waves)* Basic wave period	Time between the passage of two successive wave crests past a fixed point. $1 / f_{\mathrm{W}}$	s
T_{WV}	TWV	*(environmental mechanics, waves)* Wave period estimated from visual observation		s
$T_{x\mathrm{P}}$	TXP	*(ships, propulsor performance)* Propeller Thrust along shaft axis		N
$T_{y\mathrm{P}}$	TYP	*(ships, propulsor performance)* Propeller normal force in *y* direction in propeller axis		N
T_z	TNHE	*(ships, seakeeping)* Natural period of heave		s
$T_{z\mathrm{P}}$	TZP	*(ships, propulsor performance)* Propeller normal force in *z* direction in propeller axis		N
T_θ	TNPI	*(ships, seakeeping)* Natural period of pitch		s
T_φ	TNRO	*(ships, seakeeping)* Natural period of roll		s
t	TI	(*fundamental, time and frequency domain quantity, ships, basic quantities*) Time	$-\infty \ ... +\infty$	s
t	TE	*(ships, basic quantities)* Temperature		K
t	TT	*(ships, hull geometry)* Taylor tangent of the area curve	The intercept of the tangent to the sectional area curve at the bow on the midship ordinate	1
t	TM	*(ships, propulsor geometry)* Blade section thickness		m
t	TMX	*(ships, appendage geometry)* Maximum thickness of an aerofoil or a hydrofoil	Measured normal to mean line	m
t	YHA	*(ships, hydrostatics, stability)* Equivalent transverse heeling arm	Heeling moment $/\mathit{\Delta}$	m
t	THDF	*(ships, performance)* Thrust deduction fraction	$(T - R_{\mathrm{T}}) / T$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
t		*(ships, hull resistance, water jets)* Thrust deduction fraction	$(1-t)=\frac{R_{\mathrm{TBH}}}{T_{\mathrm{net}}}$	1
$t_p(v)$		*(uncertainty)* Inverse Student t	Student t-distribution for v degrees of freedom corresponding to a given probability p	1
$t_p(v_{\mathrm{eff}})$		*(uncertainty)* Inverse Student t for effective degrees of freedom	Student t-distribution for v_{eff} degrees of freedom corresponding to a given probability p in calculation of expanded uncertainty U_p	1
t_{180}	TI180	*(ships, manoeuvrability, turning circles)* Time to reach 180 degree change of heading		s
t_{A}	TEAI	*(environmental mechanics, ice)* Temperature of air		°C
t_{a}	TIA	*(ships, manoeuvrability, zig-zag man..)* Initial turning time		s
t_{c1}	TIC1	*(ships, manoeuvrability, zig-zag man..)* First time to check yaw (starboard)		s
t_{c2}	TIC2	*(ships, manoeuvrability, zig-zag man..)* Second time to check yaw (port)		s
t_{D}	TD	*(ships, propulsor geometry)* Thickness of duct profile		m
t_{d}	DURATN	*(environmental mechanics, wind)* Wind duration		s
t_{F}	TIF	*(ships, manoeuvrability, stopping man.)* Stopping time		s
t_{hc}	TCHC	*(ships, manoeuvrability, zig-zag man..)* Period of changes in heading		s
t_{I}	TEIC	*(environmental mechanics, ice)* Local temperature of ice		°C
t_j	TI(J)	(*fundamental, time and frequency domain quantity*) Sample time instances	$j\ T_S$	
t_{KL}	TRIM	*(seakeeping, large amplitude motions capsizing ships, hydrostatics, stability)* Static trim	T_{A} - T_{F} - d_{KL}	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
t_r	TIR	*(ships, manoeuvrability, zig-zag man)* Reach time		s
t_s	TRIM	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Static trim	T_A - T_F - d_{KL}	m
t_S	TSTR	*(multi-hull vessels)* Maximum thickness of strut		m
t_V	TV	*(ships, performance)* Running trim		m
t_W	TEWA	*(environmental mechanics, ice)* Temperature of water		°C

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
U	U, UN	*(ships, basic quantities)* Undisturbed velocity of a fluid		m/s
U		Expanded uncertainty	Expanded uncertainty of output estimate y that defines an interval $Y = y \pm U$ having a high level of confidence, equal to coverage factor k times the combined standard uncertainty $u_c(y)$ of y: $U = k\, u_c(y)$	
U_0		*(ships, hull resistance, water jets)* Free stream velocity		m/s
U_{10}	U10M	*(environmental mechanics, wind)* Reference mean wind speed at elevation 10 meters above sea surface	$U_{10} = (10/z)^{1/7}\, U_z^A$	m/s
U_A	UA	*(ships, propulsor performance)* Axial velocity induced by propeller		m/s
U_A	USHEAR	*(environmental mechanics, wind)* Wind shear velocity	$C_{10}^{1/2}\, U_{10}$ or $0.71 U_{10}^{1.23}$	m/s
U_AD	UADU	*(ships, propulsor performance)* Axial velocity induced by duct of ducted propeller		m/s
U_AP	UAP	*(ships, propulsor performance)* Axial velocity induced by propeller of ducted propeller		m/s
U_C	UC	*(ships, manoeuvrability, turning circles)* Speed in steady turn		m/s
U_e	UE	*(fluid mechanics, boundary layers)* Velocity at the edge of the boundary layer at $y=\delta_{995}$		m/s
U_I	UNIN	*(fluid mechanics, cavitation)* Critical velocity	Free stream velocity at which cavitation inception takes place	m/s
U_i	UIN	*(fluid mechanics, boundary layers)* Instantaneous velocity		m/s
U_m	UMR	*(fluid mechanics, boundary layers)* Time mean of velocity in boundary layer		m/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
U_p		Expanded uncertainty associated to confidence level p	Expanded uncertainty of output estimate y that defines an interval $Y = y \pm U_p$ having a high level of confidence p, equal to coverage factor k_p times the combined standard uncertainty $u_c(y)$ of y: $U_p = k_p\, u_c(y)$	
U_{R}	UR	*(ships, propulsor performance)* Radial velocity induced by propeller		m/s
U_{RP}	URP	*(ships, propulsor performance)* Radial velocity induced by propeller of ducted propeller		m/s
U_{RD}	URDU	*(ships, propulsor performance)* Radial velocity induced by duct of ducted propeller		m/s
U_{T}	UT	*(ships, propulsor performance)* Tangential velocity induced by propeller		m/s
U_{TD}	UTDU	*(ships, propulsor performance)* Tangential velocity induced by duct of ducted propeller		m/s
U_{TP}	UTP	*(ships, propulsor performance)* Tangential velocity induced by propeller of ducted propeller		m/s
U_z^{A}	UZA	*(environmental mechanics, wind)* Average wind speed at elevation z above the sea surface	$(U_z + u_{zi})^{\mathrm{A}}$ $U_z^{\mathrm{A}} = (z/10)^{1/7}\, U_{10}$ or $U_z^{\mathrm{A}} = U_{10} + U_{\mathrm{A}} \ln(z/10)$	m/s
U_∞	UFS	*(fluid mechanics, boundary layers)* Free-stream velocity far from the surface		m/s
u	U, VX, V1(1), V(1)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis x		m/s
u	U	*(fluid mechanics, flow fields)* Velocity component in direction of x axis		m/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
u	UFL	*(fluid mechanics, boundary layers)* Velocity fluctuations in boundary layer		m/s
u	UX, U	*(ships, manoeuvrability)* Surge velocity, linear velocity along body x axis		m/s
u	U	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis x		m/s
$u_{7\varphi}$	UJFI	*(ships, hull resistance, water jets)* Local tangential velocity at station 7		*m/s*
$u_{\mathrm{c}}^{2}(y)$		*(uncertainty)* Combined variance	Combined variance associated with output estimate y	1
$u_{\mathrm{c}}(y)$		*(uncertainty)* Combined standard uncertainty	Positive square root of $u_{\mathrm{c}}^{2}(y)$	1
$u_c(y)/\|y\|$		Relative combined standard uncertainty of output estimate y		
$u_{\mathrm{cA}}(y)$		*(uncertainty)* Combined standard uncertainty from Type A	From Type A evaluations alone	1
$u_{\mathrm{cB}}(y)$		*(uncertainty)* Combined standard uncertainty from Type B	From Type B evaluations alone	1
$u_c(y_i)$		*(uncertainty)* Combined standard uncertainty	Combined standard uncertainty of output estimate y_i when two or more measurands or output quantities are determined in the same measurement	1
u_i, v_i	U(I), V(I)	*(basic quantity)* Any vector quantities		
$u_i\ v_i$	UVPS	*(basic quantity)* Scalar product	$u_i v_i$	
$u_i\ v_j$	UVPD(I,J)	*(basic quantity)* Diadic product	$u_i v_j$	
$u \times v$	UVPV(I)	*(basic quantity)* Vector product	$\varepsilon_{ijk} u_j v_k$	
${}_1u_i^2(y)$		*(uncertainty)* Component of combined variance	$u_i^2(y) \equiv [c_i u(x_i)]^2$	1
${}_1u_i(y)$		*(uncertainty)* Component of combined standard uncertainty	$u_i(y) \equiv \|c_i\| u(x_i)$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
u^s	UFLS	*(fluid mechanics, boundary layers)* Root mean square value of velocity fluctuations		m/s
$u^2(x_i)$		*(uncertainty)* Estimated variance	Associated with input estimate x_i that estimates input quantity X_i	1
$u(x_i)$		*(uncertainty)* Standard deviation	Positive square root of $u^2(x_i)$	1
$u(x_i,x_j)$		*(uncertainty)* Estimated covariance		1
$u(x_i)/\|x_i\|$		*(uncertainty)* Relative standard uncertainty		1
$u(x_i, x_j)/\|x_i x_j\|$		Estimated relative covariance	Estimated relative covariance associated with input estimates x_i and x_j	
u_z , u_{zi}	UFLUCT	*(environmental mechanics, wind)* Turbulent wind fluctuations		m/s
u_τ	UTAU	*(fluid mechanics, boundary layers)* Shear (friction) velocity	$(\tau / \rho)^{1/2}$	m/s
$\dot{u}$	UR	*(solid body mechanics, rigid body motions)* Rates of change of components of linear velocity relative to body axes		m/s^2
$\dot{u}$	UXRT, UR	*(ships, manoeuvrability)* Surge acceleration, linear acceleration along body *x*-axis	du / dt	m/s^2
u^+	UPLUS	*(fluid mechanics, boundary layers)*	U / u_τ	1
$u \times v$	*UV*PV(I)	(*fundamental. coordinate and space related*) Vector product	$\varepsilon_{ijk} u_j v_k$	
u_*	USHEAR	*(environmental mechanics, wind)* Wind shear velocity	$C_{10}^{1/2}\, U_{10}$ or $0.71 U_{10}^{1.23}$	m/s
$[u(x_i)/\|x_i\|]^2$		Estimated relative variance	Estimated relative variance associated with input estimate x_i	
$[u_c(y)/\|y\|]^2$		Relative combined variance	Relative combined variance associated with output estimate y	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
V	VA	*(fluid mechanics, flow fields, sailing vessels)* Velocity of a body	$V = v_i v_i^{1/2}$	m/s
V	VO	*(ships, basic quantities)* Volume		m^3
V	DISPVOL	*(ships, hull geometry)* Displacement volume	$\Delta / (\rho\ g) = \nabla_{BH} + \nabla_{AP}$	m^3
V	V	*(ships, hull resistance, manoeuvrability, sailing vessels)* Linear velocity of origin in body axis, Speed of the model or the ship		m/s
V		*(seakeeping, large amplitude motions capsizing)* Tank total capacity		m^3
V^0	V0, OMN	*(ships, basic quantities)* Rotational velocity	$2\ \pi\ n$	rad/s
$V^0{}_i$	V0(I),V(I)	(*fundamental. coordinate and space related*) Zeroth order moments of a vector quantity distributed in space, referred to an orthogonal system of Cartesian coordinates fixed in the body	$\int dv_i$	
V_0	V0	*(ships, manoeuvrability)* Approach speed		m/s
V_0	V0	*(fluid mechanics, flow fields)* Velocity of undisturbed flow		m/s
V_0		*(seakeeping, large amplitude motions capsizing)* Speed of craft in the turn - IMO/HSC'2000 Service speed - IMO/IS		m/s
V^1	V, V1	*(ships, basic quantities)* Linear or translatory velocity of a body	ds / dt	m/s
$V^1{}_i$	V1(I)	(*fundamental. coordinate and space related*) First order moments of a vector distribution	$\int \varepsilon_{ijk} x_j dv_k$	
V_A	VA	*(ships, manoeuvrability)* Approach speed		m/s
V_A	VA	*(ships, performance, propulsor performance)* Advance speed of propeller	Equivalent propeller open water speed based on thrust or torque identity	m/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
V_{BM}	VBM	*(planing, semi-displacement vessels)* Mean bottom velocity	Mean velocity over bottom of the hull	m/s
V_{F}	VF	*(ships, manoeuvrability)* Flow or current velocity		m/s
V_{I}	VI	*(fluid mechanics, lifting surfaces)* Induced velocity		m/s
V_i	V(I)	*(ships, unsteady propeller forces)* Velocity field of the wake	i = 1, 2, 3	m/s
V_i	*V*0(I),*V*(I)	(*fundamental. coordinate and space related*) Zeroth order moments of a vector quantity distributed in space, referred to an orthogonal system of Cartesian coordinates fixed in the body	$\int dv_i$	
V_{K}	VKN	*(ships, hull resistance)* Speed in knots		
V_{L}	VOLS	*(fluid mechanics, cavitation)* Volume loss	W_{L} / w	m^3
V_{mc}	VMC	*(sailing vessels)* Velocity made good on course		m/s
V_{mg}	VMG	*(sailing vessels)* Velocity made good to windward (contrary to wind direction)		m/s
V_{P}	VP	*(ships, propulsor performance)* Mean axial velocity at propeller plane of ducted propeller		m/s
V_{S}	VS	*(ships, propulsor performance)* Section advance speed at 0.7 *R*	$(V_{\mathrm{A}}^2 + (0.7\,R\,\omega)^2)^{1/2}$	m/s
V_{SP}	VSP	*(planing, semi-displacement vessels)* Spray velocity	Relative velocity between hull and spray in direction of the spray	m/s
V_{T}	VT	*(fluid mechanics, lifting surfaces)* Resultant velocity of flow approaching a hydrofoil	Taking vortex induced velocities into account	m/s
V_{tw}	VWABS	*(sailing vessels)* True wind velocity		m/s
V_{u}	V(URT)	*(ships, manoeuvrability)* Generalized velocity		m/s
$\dot{V}_{\mathrm{u}}$	V(URT)	*(ships, manoeuvrability)* Generalized acceleration		$\mathrm{m/s^2}$

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
V_{u}	V(U)	(*fundamental. coordinate and space related*) Generalized vector	$V_i = V^0_i$ $V_{3+i} = V^1_i$	
V_{WR}	VWREL	*(ships, hull resistance, manoeuvrability, environmental mechanics, wind, sailing vessels)* Relative wind velocity, apparent wind velocity		m/s
V_{WT}	VWABS	*(ships, manoeuvrability, environmental mechanics, wind)* True wind velocity		m/s
v	UY, V	*(ships, manoeuvrability)* Sway velocity, linear velocity along body y-axis		m/s
v	V	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis y		m/s
v		*(seakeeping, large amplitude motions capsizing)* Tank total capacity		m^3
v	V	*(fluid mechanics, flow fields)* Velocity component in direction of y axis		m/s
$v^0{}_1$	P, OMX, V0(1), V(4)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis x		rad/s
$v^0{}_2$	Q, OMY, V0(2), V(5)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis y		rad/s
$v^0{}_3$	R, OMZ, V0(3), V(6)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis z		rad/s
$v^1{}_1$	U, VX, V1(1), V(1)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis x		m/s
$v^1{}_2$	V, VY, V1(2), V(2)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis y		m/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
v^1_3	W, VZ, V1(3), V(3)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis *z*		m/s
v_1	U, VX, V1(1), V(1)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis *x*		m/s
v_1	VX, V1	*(fluid mechanics, flow fields)* Velocity component in direction of *x*, *y*, *z* axes		m/s
v_2	V1(2), V(2)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis *y*		m/s
v_2	VY, V2	*(fluid mechanics, flow fields)* Velocity component in direction of *x*, *y*, *z* axes		m/s
v_3	V1(3), V(3)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis *z*		m/s
v_3	VZ, V3	*(fluid mechanics, flow fields)* *(fluid mechanics, flow fields)* Velocity component in direction of *x*, *y*, *z* axes		m/s
v_4	V0(1), V(4)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis *x*		rad/s
v_5	Q, OMY, V0(2), V(5)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis *y*		rad/s
v_6	R, OMZ, V0(3), V(6)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis *z*		rad/s
v_A	POAI	*(environmental mechanics, ice)* Relative volume of air	Volume of gas pores per unit volume of ice	1
v_B	POBR	*(environmental mechanics, ice)* Relative volume of brine	Volume of liquid phase per unit volume of ice	1
v_0	POIC	*(environmental mechanics, ice)* Total porosity of ice	$v_0 = v_A + v_B$	1
v_i	V(I)	*(fluid mechanics, flow fields)* Velocity		m/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
v_{u}	V(U)	*(solid body mechanics, rigid body motions)* Components of generalized velocity or motion relative to body axes	$v_i = v^1{}_i$ $v_{3+i} = v^0{}_i$	m/s rad/s
v_y	VY, V2	*(fluid mechanics, flow fields)* Velocity component in direction of x, y, z axes		m/s
v_{W}		*(seakeeping, large amplitude motions capsizing)* Wind speed used in calculation		m/s
v_x	VX,	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis x		m/s
v_y	V, VY, V1(2), V(2)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis y		m/s
v_z	W, VZ, V1(3), V(3)	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis z		m/s
$u \times v$	*UV*PV(I)	(*fundamental. coordinate and space related*) Vector product	$\varepsilon_{ijk} u_j v_k$	
$\dot{v}$	VR	*(solid body mechanics, rigid body motions)* Rates of change of components of linear velocity relative to body axes		m/s^2
$\dot{v}$	UYRT, VR	*(ships, manoeuvrability)* Sway acceleration, linear acceleration along body y-axis	dv / dt	m/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
W	WT	*(ships, basic quantities)* Weight (force), gravity force acting on a body		N
W	SHIPWT	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Ship weight	$m\ g$	N
We	WN	*(fluid mechanics, flow parameter)* Weber number	$V^2\ L\ /\ \kappa$	1
W_F	WTF	*(hydrofoil boats)* Weight of foil		N
W_L	WTLS	*(fluid mechanics, cavitation)* Weight loss	Weight of material eroded from a specimen during a specified time	N/s
w	WD	*(ships, basic quantities, fluid mechanics, flow parameter)* Weight density, formerly specific weight	$dW\ /\ dV = \rho g$	N/m^3
w	WPUL	*(solid body mechanics, loads)* Weight per unit length	$dW\ /\ dx_1$	N/m
w	W	*(solid body mechanics, rigid body motions)* Translatory velocity in the direction of body axis z		m/s
w	W	*(fluid mechanics, flow fields)* Velocity component in direction of z axis		m/s
w	WFT	*(ships, performance)* Taylor wake fraction in general	$(V - V_A)\ /\ V$	1
w	UZ, W	*(ships, manoeuvrability)* Heave velocity, linear velocity along body z-axis		m/s
w	VZ, V3	*(fluid mechanics, flow fields)* Velocity component in direction of x, y, z axes		m/s
w_1		*(ships, hull resistance, water jets)* Geometric intake width at station 1		m
w_{1A}		*(ships, hull resistance, water jets)* Width of capture area measured over hull surface at station 1A		m
w_F	WFF	*(ships, performance)* Froude wake fraction	$(V - V_A)\ /\ V_A$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
w_Q	WFTQ	*(ships, performance)* Torque wake fraction	Propeller speed V_A determined from torque identity	1
w_T	WFTT	*(ships, performance)* Thrust wake fraction	Propeller speed, V_A, determined from thrust identity	1
$\dot{w}$	UZRT, WR	*(solid body mechanics, rigid body motions, ships, manoeuvrability)* Heave acceleration, linear acceleration along body *z*-axis	dw / dt	m/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
X		(*fundamental, time and frequency domain quantity*) Real "valued" function		
X	X	*(solid body mechanics, loads)* Force in direction of body axis x		N
X	X	*(ships, unsteady propeller forces)* Cylindrical coordinates	Cylindrical system with origin O and longitudinal x-axis as defined before; angular a-(attitude)-coordinate , zero at 12 o'clock position, positive clockwise looking forward, r distance measured from the x-axis	m
X	FX	*(ships, manoeuvrability, seakeeping)* Surge force on body, force along body x-axis		N
X		*(sailing vessels)* Components of resultant force along designated axis		N
X_1		*(seakeeping, large amplitude motions capsizing)* Roll damping coefficients		1
X_2		*(seakeeping, large amplitude motions capsizing)* Roll damping coefficients		1
X_{CB}	XCB	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal centre of buoyancy (L_{CB})	Longitudinal distance from reference point to the centre of buoyancy, B such as X_{MCF} from Midships	m
X_{CF}	XCF	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal centre of flotation (L_{CF})	Longitudinal distance from reference point to the centre of flotation, F such as X_{MCF} from Midships	m
X_{CG}	XCG	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal centre of gravity (L_{CG})	Longitudinal distance from a reference point to the centre of gravity, G such as X_{MCG} from Midships	m
X_F	FDIM	*(environmental mechanics, wind)* Dimensionless Fetch	gF/U_{19}^2	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
X_{H}	XH	*(ACV and SES)* Horizontal spacing between inner and outer side skirt hinges or attachment points to structure	needs clarification	m
X_{R}	XRU	*(ships, manoeuvrability, seakeeping)* Longitudinal rudder force		N
X_{S}	XS	*(ACV and SES)* Distance of leading skirt contact point out-board or outer hinge of attachment point to structure	needs clarification	m
X_i		i^{th} input quantity	i^{th} input quantity on which measurand Y depends NOTE Xi may be the physical quantity or the random variable	
$X_{i,k}$		k^{th} independent repeated observation of X_i		
X_u	XU	*(ships, manoeuvrability, seakeeping)* Derivative of surge force with respect to surge velocity	$\partial X / \partial u$	Ns/m
$X_{\dot{u}}$	XURT	*(ships, manoeuvrability, seakeeping)* Derivative of surge force with respect to surge acceleration	$\partial X / \partial \dot{u}$	Ns^2/m
$\overline{X}_i$		Estimate of the value of input quantity X_i	Estimate of the value of input quantity X_i equal to the arithmetic mean or average of n independent repeated observation $X_{i,k}$ of X_i	
x	X	(*fundamental. coordinate and space related*) Body axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in the body	m
x	X, Y	(*fundamental, statistical, stochastic*) Stationary stochastic process	$x(\zeta,t)$, $y(\zeta,t)$	
x	x	(*fundamental, time and frequency domain quantity*) Values of real quantities	$x(t)$	
x	XLO	*(ships, performance)* Load fraction in power prediction	$\eta_{\mathrm{D}}\, P_{\mathrm{D}} / P_{\mathrm{E}} - 1$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
x	X	*(ships, unsteady propeller forces)* Cylindrical coordinates	Cylindrical system with origin O and longitudinal *x*-axis as defined before; angular a-(attitude)-coordinate , zero at 12 o'clock position, positive clockwise looking forward, r distance measured from the *x*-axis	m
x	X	*(ships, unsteady propeller forces)* Cartesian coordinates	Origin O coinciding with the centre of the propeller. The longitudinal *x*-axis coincides with the shaft axis, positive forward; the trans-verse *y*-axis, positive to port; the third, *z*-axis, positive upward	m
x	*X*, *Y*	(*fundamental, statistical*) Random quantities	$x(\zeta)$, $y(\zeta)$	
x_0	X0	(*fundamental. coordinate and space related*) Space axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the space	m
x_{01}	X0(1)	(*fundamental. coordinate and space related*) Space axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the space	m
x_{02}	X0(2)	(*fundamental. coordinate and space related*) Space axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the space	m
x_{03}	X0(3)	(*fundamental. coordinate and space related*) Space axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the space	m
x_{090}	X090	*(ships, manoeuvrability, turning circles)* Advance at 90° change of heading		m
x_{0180}	X0180	*(ships, manoeuvrability, turning circles)* Advance at 180° change of heading		m
x_{0F}	X0F	*(ships, manoeuvrability, stopping man.)* Head reach		m
x_{0max}	XMX	*(ships, manoeuvrability, turning circles)* Maximum advance		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
x_1	X(1)	(*fundamental. coordinate and space related*) Body axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in the body	m
x_2	X(2)	(*fundamental. coordinate and space related*) Body axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in the body	m
x_3	X(3)	(*fundamental. coordinate and space related*) Body axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in the body	m
x^{A}	*X*A	(*fundamental, time and frequency domain quantity*) Analytic function	$X^{A}(t) = X(t) + iX^{H}(t)$	
x^{A}	*X*MS	(*fundamental, statistical*) Average or sample mean of a random quantity	$1/n \Sigma x_i$, $i = 1...n$ unbiased random estimate of the expectation with $x^{AE} = x^{E}$ $x^{VSE} = x^{V} / n$	
x_B	XBDR	*(ships, propulsor geometry)* Boss to diameter ratio	d_h / D	
x_{CB}	XACB	*(ships, hydrostatics, seakeeping, large amplitude motions capsizing)* Longitudinal centre of floatation of added buoyant layer	Longitudinal distance from reference point to the centre of the added buoyant layer, *b* such as x_{MCb} from Midships	m
x_{CF}	XACF	*(ships, hydrostatics, seakeeping, large amplitude motions capsizing)* Longitudinal centre of flotation of added buoyant layer	Longitudinal distance from reference point to the centre of flotation of the added buoyant layer, *f* such as x_{MCf} from Midships	m
x_{CG}	XACG	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Longitudinal centre of gravity of added weight (mass)	Longitudinal distance from reference to the centre of gravity, *g*, of an added or removed weight (mass) such as x_{MCg} from Midships	m
x^{D}	*X*DR	(*fundamental, statistical*) Standard deviation of a random quantity	$x^{VR\ 1/2}$	
x_D		*(seakeeping, large amplitude motions capsizing)* Distance of down flooding opening from end of boat		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
x^{DF}	*X*DF	(*fundamental, time and frequency domain quantity*) Fourier transform of ampled function	$X^{\mathrm{DF}}(f) = \Sigma x_j \exp(-i2\pi f j T_{\mathrm{S}})$ i.e. periodically repeating= $X(0)/2 + f_{\mathrm{S}} \Sigma X^F(f + j f_{\mathrm{S}})$ sample theorem: aliasing!	
x^{DL}	XDL	(*fundamental, time and frequency domain quantity*) Laurent transform Sampled function	$X^{\mathrm{DL}}(s) = \Sigma x_j \exp(-s j T_{\mathrm{S}})$	
x^{DR}	*X*DR	(*fundamental, statistical*) Standard deviation of a random quantity	$x^{\mathrm{VR}\ ½}$	
x^{DS}	*X*DS	(*fundamental, statistical*) Sample deviation of a random quantity	$x^{\mathrm{VS}\ ½}$, unbiased random estimate of the standard deviation	
x^E	*X*MR	(*fundamental, statistical*) Expectation or population mean of a random quantity	$E(x)$	
x_{F}	XF	(*fundamental. coordinate and space related*) Flow axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the flow	m
x^{F}	*X*FT	(*fundamental, time and frequency domain quantity*) Fourier transform	$X^{\mathrm{F}}(f) = \int X(t) \exp(-i2\pi f t) dt$ inverse form: $= \int X^{\mathrm{F}}(f) \exp(-i2\pi f t) dt$ if $X(t) = 0$ and a = 0 then $X^{\mathrm{F}}(f) = X^{\mathrm{L}}(f)$	
x_{F1}	XF(1)	(*fundamental. coordinate and space related*) Flow axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the flow	m
x_{F2}	XF(2)	(*fundamental. coordinate and space related*) Flow axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the flow	m
x_{F3}	XF(3)	(*fundamental. coordinate and space related*) Flow axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the flow	m
x^{F}_j	*X*FT(J)	(*fundamental, time and frequency domain quantity*) Fourier transform of periodic function	$1/T_{\mathrm{C}} \int X(t) \exp(-i2\pi j t / T_{\mathrm{C}}) dt$ t = 0 . . T_{C} $X^{\mathrm{F}} = \Sigma x^{\mathrm{F}}_j \delta(f - j/T_C)$ inverse form: $X(t) = \Sigma x^{\mathrm{F}}_j \exp(-i2\pi f j T_{\mathrm{C}})$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
x^{H}	*X*HT	(*fundamental, time and frequency domain quantity*) Hilbert transform	$X^{\mathrm{H}}(t) = 1/\pi \int X(\tau)/(t - \tau)d\tau$	
x^{HF}	*X*HF	(*fundamental, time and frequency domain quantity*) Fourier transform of Hilbert transform	$X^{\mathrm{HF}}(f) = X^{\mathrm{F}}(f)(-i \operatorname{sgn} f)$ $(1/t)^F = -i \operatorname{sgn} f$	
x_i	*X*(I), *Y*(I)	(*fundamental, statistical*) Samples of random quantities	$i = 1... n$ n : sample size	
x_i	X(I)	*(ships, seakeeping)* Absolute displacement of the ship at the reference point	i = 1, 2, 3 :surge, sway, and heave respectively	m
x_i		Estimate of input quantity X_i	Estimate of input quantity X_i NOTE when x_i is determined from the arithmetic mean or average of n independent repeated observation $x_i = \overline{X}_i$	
x_j	*X*(J)	(*fundamental, time and frequency domain quantity*) Variables for samples values of real quantities	$x(t_j) = \int x(t)\delta(t - t_j)dt$	
x^{L}	*X*LT	(*fundamental, time and frequency domain quantity*) Laplace transform	$X^{\mathrm{L}}(s) = \int X(t)\exp(-st)dt$ if $X(t<0) = 0$ then $= (X(t)\exp(-at))^F$	
x^{M}	*X*MR	(*fundamental, statistical*) Expectation or population mean of a random quantity	$E(x)$	
$(x^m)^E$	*X*mMR	(*fundamental, statistical*) m-th moment of a random quantity	$(x^m)^E$	
x^{MR}	*X*MR	(*fundamental, statistical*) Expectation or population mean of a random quantity	$E(x)$	
x^{MS}	*X*MS	(*fundamental, statistical*) Average or sample mean of a random quantity	$1/n \sum x_i$, $i = 1...n$ unbiased random estimate of the expectation with $x^{\mathrm{A}E} = x^E$ $x^{\mathrm{VS}E} = x^V / n$	
x^{PD}	*X*PD	(*fundamental, statistical*) Probability density of a random quantity	$d F_x / dx$	
x^{PF}	*X*PF	(*fundamental, statistical*) Probability function (distribution) of a random quantity		1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
x_{P}	XP	*(ships, propulsor geometry)* Longitudinal propeller position	Distance of propeller centre forward of the after perpendicular	m
x^{R}	*X*RT	(*fundamental*, *time and frequency domain quantity*) Laurent transform	$X^{\mathrm{R}}(r) = \Sigma x_j r^{-j} = X^{\mathrm{DL}}$	
x_{R}	XRU	*(ships, manoeuvrability)* Longitudinal position of rudder axis		m
x^{S}	*X*S	(*fundamental*, *time and frequency domain quantity*) Single-sided complex spectra	$X^{\mathrm{S}}(f) = X^{\mathrm{F}}(f)(1 + \mathrm{sgn}\, f)$ $= X^{\mathrm{AF}}$ i.e. = 0 for $f < 0$	
$x^{\mathrm{S}}{}_j$	*X*S(J)	(*fundamental*, *time and frequency domain quantity*) Single-sided complex Fourier series	$X^{\mathrm{F}}{}_j(1 + \mathrm{sgn}\, j)$ line spectra	
x_u	X(U)	*(ships, seakeeping)* Generalized displacement of a ship at the reference point	u = 1...6 surge, sway, heave, roll, pitch, yaw	m rad
x^V	XVR, XXVR	(*fundamental*, *statistical*) Variance of a random quantity	$x^{2\,E} - x^{E\,2}$	
$x^{V\mathrm{R}}$	XVR, XXVR	(*fundamental*, *statistical*) Variance of a random quantity	$x^{2\,E} - x^{E\,2}$	
$x^{V\mathrm{S}}$	*X*VS, *XX*VS	(*fundamental*, *statistical*) Sample variance of a random quantity	$1/\,(n - 1)\ \Sigma\ (x_i - x^{\mathrm{A}})^2$ $i = 1...n$ unbiased random estimate of the variance $x^{V\mathrm{SE}} = x^V$	
xx^{C}	*XX*CR	(*fundamental*, *statistical*, *stochastic*) Auto-covariance of a stationary stochastic process	$(x(t) - x^E)(x(t + \tau) - x^E)^E$	
xx^{CR}	*XX*CR	(*fundamental*, *statistical*, *stochastic*) Auto-covariance of a stationary stochastic process	$(x(t) - x^E)(x(t + \tau) - x^E)^E$	
xx^{MR}	*XX*MR	(*fundamental*, *statistical*) Auto-correlation of a random quantity	$x\ x^E$	
xx^{R}	*XX*MR	(*fundamental*, *statistical*) Auto-correlation of a random quantity	$x\ x^E$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
xx^{RR}	*XX*RR	(*fundamental, statistical, stochastic*) Auto-correlation of a stationary stochastic process	$x(t)x(t+\tau)^E = R_{xx}(\tau)$ $R_{xx}(\tau) = R_{xx}(-\tau)$ if x is ergodic: $R_{xx}(\tau) = x(t)x(t+\tau)^{MR}$ $R_{xx}(\tau) = \int S_{xx}(\omega)\cos(\omega\tau)d\tau$ $\tau = 0 \ldots \infty$	
xx^{S}	*XX*SR	(*fundamental, statistical, stochastic*) Power spectrum or autospectral power density of a stochastic process	xx^{RRSR}	
$xx^{V\mathrm{R}}$	XVR, XXVR	(*fundamental, statistical*) Variance of a random quantity	$x^{2\,E} - x^{E\,2}$	
$xx^{V\mathrm{S}}$	*X*VS, *XX*VS	(*fundamental, statistical*) Sample variance of a random quantity	$1/(n-1)\,\Sigma\,(x_i - x^A)^2$ $i = 1 \ldots n$ unbiased random estimate of the variance $x^{VSE} = x^V$	
xy^{C}	*XY*CR	(*fundamental, statistical, stochastic*) Cross-covariance of two stationary stochastic processes	$(x(t) - x^E)(y(t+\tau) - y^E)^E$	
xy^{CR}	*XY*CR	(*fundamental, statistical, stochastic*) Cross-covariance of two stationary stochastic processes	$(x(t) - x^E)(y(t+\tau) - y^E)^E$	
xy^{MR}	*XY*MR	(*fundamental, statistical*) Cross-correlation of two random quantities	$x\,y^E$	
xy^{PD}	*XY*PD	(*fundamental, statistical*) Joint probability density of two random quantities	$\partial^2 F_{xy} / (\partial x\,\partial y)$	
xy^{PF}	*XY*PF	(*fundamental, statistical*) Joint probability function (distribution) function of two random quantities		1
xy^{R}	*XY*MR	(*fundamental, statistical*) Cross-correlation of two random quantities	$x\,y^E$	
xy^{R}	*XY*RR	(*fundamental, statistical, stochastic*) Cross-correlation of two stationary stochastic processes	$x(t)y(t+\tau)^E = R_{xy}(\tau)$ $R_{yx}(\tau) = R_{xy}(-\tau)$ if x, y are ergodic: $R_{xy}(\tau) = x(t)y(t+\tau)^{\mathrm{MR}}$	
xy^{S}	*XY*SR	(*fundamental, statistical, stochastic*) Cross-power spectrum of two stationary stochastic processes	xy^{RRSR}	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
xy^V	*XY*VR	(*fundamental*, *statistical*) Variance of two random quantities	$x\,y^E - x^E\,y^E$	
$xy^{V\mathrm{R}}$	*XY*VR	(*fundamental*, *statistical*) Variance of two random quantities	$x\,y^E - x^E\,y^E$	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Y	FY	*(solid body mechanics, loads, ships, manoeuvrability, seakeeping)* Sway force, force in direction of body axis *y*		N
Y		*(sailing vessels)* Components of resultant force along designated axis		N
Y		A measurand. Estimated relative uncertainty of standard uncertainty $u(x_i)$ of inputs estimate x_i		
Y_{CG}	YCG	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Lateral displacement of centre of gravity (Y_{CG})	Lateral distance from a reference point to the centre of gravity, G	m
Y_r	YR	*(ships, manoeuvrability, seakeeping)* Derivative of sway force with respect to yaw velocity	$\partial Y / \partial r$	Ns
Y_{R}	YRU	*(ships, manoeuvrability, seakeeping)* Transverse rudder force		N
$Y_{\dot{r}}$	YRRT	*(ships, manoeuvrability, seakeeping)* Derivative of sway force with respect to yaw acceleration	$\partial Y / \partial \dot{r}$	Ns^2
Y_v	YV	*(ships, manoeuvrability, seakeeping)* Derivative of sway force with respect to sway velocity	$\partial Y / \partial v$	Ns/m
$Y_{\dot{v}}$	YVRT	*(ships, manoeuvrability, seakeeping)* Derivative of sway force with respect to sway acceleration	$\partial Y / \partial \dot{v}$	Ns^2/m
$Y_z(\omega)$		*(ships, seakeeping)* Amplitude of frequency response function for translatory motions	$z_a(\omega) / \zeta_a(\omega)$ or $z_a(\omega) / \eta_a(\omega)$	1
Y_δ	YD	*(ships, manoeuvrability, seakeeping)* Derivative of sway force with respect to rudder angle	$\partial Y / \delta$	N

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$Y_{\theta\zeta}(\omega)$		*(ships, seakeeping)* Amplitude of frequency response function for rotary motions	$\Theta_a(\omega)$ / $\zeta_a(\omega)$ or $\Theta_a(\omega)$ / $(\omega^2/ (g\zeta_a(\omega)))$	1
y	X, Y	(*fundamental, statistical, stochastic*) Stationary stochastic process	$x(\zeta,t)$, $y(\zeta,t)$	
y	X, Y	(*fundamental, statistical*) Random quantities	$x(\zeta)$, $y(\zeta)$	
y	Y	*(ships, unsteady propeller forces)* Cartesian coordinates	Origin O coinciding with the centre of the propeller. The longitudinal *x*-axis coincides with the shaft axis, positive forward; the trans-verse *y*-axis, positive to port; the third, *z*-axis, positive upward	m
y	X, X(1) Y, X(2) Z, X(3)	(*fundamental. coordinate and space related*) Body axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in the body	m
y		Estimated of measurand *Y* or Result of a measurement or Output estimate		
y_0	X0, X0(1) Y0, X0(2) Z0, X0(3)	(*fundamental. coordinate and space related*) Space axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the space	m
y_{090}	Y090	*(ships, manoeuvrability, turning circles)* Transfer at 90° change of heading		m
y_{0180}	Y0180	*(ships, manoeuvrability, turning circles)* Tactical diameter (transfer at 180° change of heading)		m
y_{0F}	Y0F	*(ships, manoeuvrability, stopping manoeuvre)* Lateral deviation		m
$y_{0\max}$	Y0MX	*(ships, manoeuvrability, turning circles)* Maximum transfer		m
$y_{0\max}$	Y0MX	*(ships, manoeuvrability, zig-zag manoeuvre)* Maximum transverse deviation		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
y_{CG}	YCG	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Lateral displacement of centre of gravity (Y_{CG})	Lateral distance from a reference point to the centre of gravity, G	m
y_{D}		*(seakeeping, large amplitude motions capsizing)* Distance of down flooding opening from gunwale		m
y_{D}'		*(seakeeping, large amplitude motions capsizing)* Distance of down flooding opening off centreline		m
y_{F}	YF	(*fundamental. coordinate and space related*) Flow axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the flow	m
y_i	*Y*(I)	(*fundamental, statistical*) Samples of random quantities	$i = 1... n$ where n : sample size	
y_i		Estimate of measurand Y_i	Estimate of measurand Y_i when two or more measurands are determined in the same measurement	
y_{P}	YP	*(ships, propulsor geometry)* Lateral propeller position	Transverse distance of wing propeller centre from middle line	m
y^{+}	YPLUS	*(fluid mechanics, boundary layers)* Non-dimensional distance from the wall	$y\, u_{\tau} / v$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Z	Z, FZ,	*(solid body mechanics, loads)* Force in direction of body axis z		Nm
Z	NPB	*(ships, propulsor geometry)* Number of propeller blades		1
Z	ZRA	*(ships, hydrostatics, stability)* Intersection of righting arm with line of action of the centre of buoyancy		
Z	FZ	*(ships, manoeuvrability, seakeeping)* Heave force on body, force along body z-axis		N
Z		*(sailing vessels)* Components of resultant force along designated axis		N
Z	ZRA	*(seakeeping, large amplitude motions capsizing)* Intersection of righting arm with line of action of the centre of buoyancy		
Z		*(seakeeping, large amplitude motions capsizing)* Vertical distance from the centre of A to the centre of the underwater lateral area or approximately to a point at one half the draught - IMO/IS		m
Z		*(seakeeping, large amplitude motions capsizing)* Vertical distance from the centre of A to the waterline		m
Z_{CE}	ZCE	*(sailing vessels)* Height of centre of effort of sails above waterline in vertical centre plane		m
Z_{H}	ZH	*(ACV and SES)* Vertical spacing between inner and outer side skirt hinges or attachment points to structure	needs clarification	m
z	Z	(*fundamental. coordinate and space related*) Body axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in the body	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
z	*Z*	(*fundamental, time and frequency domain quantity*) Complex variable		
z	ZSURF	*(environmental mechanics, wind)* Height above the sea surface in meters		m
z	NPB	*(ships, propulsor geometry)*Number of propeller blades		1
z	Z	*(ships, unsteady propeller forces)* Cartesian coordinates	Origin O coinciding with the centre of the propeller. The longitudinal *x*-axis coincides with the shaft axis, positive forward; the trans-verse *y*-axis, positive to port; the third, *z*-axis, positive upward	m
z_0	Z0	(*fundamental. coordinate and space related*) Space axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the space,	m
z_6		*(ships, hull resistance, water jets)* Vertical distance of nozzle centre relative to undisturbed surface		m
z^a	ZAM	(*fundamental, time and frequency domain quantity*) Amplitude	mod(z) = sqrt(z^{r2}+z^{i2})	m
z^c	ZRE	(*fundamental, time and frequency domain quantity*) Real or cosine component	z^c = real(z) = z^acos(z^p)	
z_D		*(seakeeping, large amplitude motions capsizing)* Height above waterline of down flooding opening		m
z_F	ZF	(*fundamental. coordinate and space related*) Flow axes and corresponding Cartesian coordinates	Right-hand orthogonal system of coordinates fixed in relation to the flow	m
z^i	ZIM	(*fundamental, time and frequency domain quantity*) Imaginary or sine component	imag(z) = z^asin(z^p) = z^s	
z^j	ZCJ	(*fundamental, time and frequency domain quantity*) Conjugate	z^r - iz^i	

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
z^l	ZLG	(*fundamental, time and frequency domain quantity*) (Phase) Lag	$- z^p$	
z^p	ZPH	(*fundamental, time and frequency domain quantity*) Phase	$\mathrm{arc}(z) = \mathrm{arctg}(z^i / z^r)$	
z_P	ZP	*(ships, propulsor geometry)* Vertical propeller position	Height of propeller centre above base line	m
z^r	ZRE	*(fundamental, time and frequency domain quantity) Real or cosine component*	$\mathrm{real}(z) = z^a\cos(z^p) = z^c$	1
z^s	ZIM	(*fundamental, time and frequency domain quantity*) Imaginary or sine component	$z^s = imag(z) = z^a\sin(z^p)$	1
z_S	ZS	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Mean static sinkage	$(z_{SF} + z_{SA}) / 2$	m
z_{SA}	ZSA	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Static sinkage at AP	Caused by loading	m
z_{SF}	ZSF	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Static sinkage at FP	Caused by loading	m
z_V	ZV	*(ships, performance)* Running sinkage of model or ship		m
z_{VA}	ZVA	*(ships, hull resistance)* Running sinkage at AP		m
z_{VF}	ZVF	*(ships, hull resistance)* Running sinkage at FP		m
z_{VM}	ZVM	*(ships, hull resistance)* Mean running sinkage	$(z_{VF} + z_{VA}) / 2$	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
α	AA	*(solid body mechanics, rigid body motions)* Angular acceleration	$d\omega/dt$	rad/s^2
α	AT ALFA	*(solid body mechanics, rigid body motions)* Angle of attack	The angle of the longitudinal body axis from the projection into the principal plane of symmetry of the velocity of the origin of the body axes relative to the fluid, positive in the positive sense of rotation about the y-axis	rad
α	AA, ALFA	*(fluid mechanics, lifting surfaces)* Angle of attack or incidence	Angle between the direction of undisturbed relative flow and the chord line	rad
α	GC	*(fluid mechanics, cavitation)* Gas content	Actual amount of solved and undissolved gas in a liquid	ppm
α	AAPI	*(ships, manoeuvrability)* Pitch angle	Angle of attack in pitch on the hull	rad
α_0	AAZL ALF0	*(fluid mechanics, lifting surfaces)* Angle of zero lift	Angle of attack or incidence at zero lift	rad
α_B	ALFSL	*(planing, semi-displacement vessels)* Angle of stagnation line	Angle between projected keel and stagnation line in a plane normal to centre plane and parallel to reference line	rad
α_{BAR}	ALFBAR	*(planing, semi-displacement vessels)* Barrel flow angle	Angle between barrel axis and assumed flow lines	rad
α_c	ALFTW	*(hydrofoil boats)* Geometric angle of twist		rad
α_D	AD	*(ships, propulsor geometry)* Duct profile-shaft axis angle	Angle between nose-tail line of duct profile and propeller shaft	rad
α_{EFF}	AAEF, ALFE	*(fluid mechanics, lifting surfaces)* Effective angle of attack or incidence	The angle of attack relative to the chord line including the effect of induced velocities	rad
α_{FB}	ANFB	(*ships, appendage geometry*) Bow fin angle		rad
α_{FS}	ANFS	(*ships, appendage geometry*) Stern fin angle		rad
α_G	AAGE, ALFG	(*fluid mechanics, lifting surfaces)* Geometric angle of attack or incidence	The angle of attack relative to the chord line neglecting the effect of induced velocities	rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
α_{H}	AAHY, ALFI	*(fluid mechanics, lifting surfaces)* Hydrodynamic angle of attack	In relation to the position at zero lift	rad
α_{I}	AAID, ALFS	*(fluid mechanics, lifting surfaces)* Ideal angle of attack	For thin airfoil or hydrofoil, angle of attack 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"	rad
α_{IND}	ALFIND	*(hydrofoil boats)* Downwash or induced angle		rad
α_{M}	ALFM	*(hydrofoil boats)* Angle of attack of mean lift coefficient for foils with twist		rad
α_{S}	GS	*(fluid mechanics, cavitation)* Gas content of saturated liquid	Maximum amount of gas solved in a liquid at a given temperature	ppm
a_{s}	GR	*(fluid mechanics, cavitation)* Gas content ratio	$\alpha / \alpha_{\mathrm{S}}$	1
α_{s}	AFS	*(hydrofoil boats)* Angle of attack for which flow separation (stall) occurs		rad
α_{TO}	ATO	*(hydrofoil boats)* Incidence angle at take-off speed		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
β	DR BET	*(solid body mechanics, rigid body motions)* 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	rad
β	BETE	*(fluid mechanics, boundary layers)* Equilibrium parameter	$\delta^* / (\tau_w\, dp / dx)$	1
β	BETD	*(planing, semi-displacement vessels)* Deadrise angle of planing bottom	Angle between a straight line approximating body section and the intersection between basis plane and section plane	rad
β	APSF	*(ships, performance)* Appendage scale effect factor	Ship appendage resistance divided by model appendage resistance	1
β	AADR	*(ships, manoeuvrability)* Drift angle	Angle of attack in yaw on the hull	rad
β	BETB	*(ships, propulsor performance)* Advance angle of a propeller blade section	arctg $(V_A / R\, \omega)$	rad
β_C	DRCI	*(ships, manoeuvrability, turning circles)* Drift angle at steady turning		rad
β_D	BD	*(ships, propulsor geometry)* Diffuser angle of duct	Angle between inner duct tail line and propeller shaft	rad
β_I	BETI	*(ships, propulsor, performance)* Hydrodynamic flow angle of a propeller blade section	Flow angle taking into account induced velocity	rad
β_L	BETAL	*(sailing vessels)* leeway angle		rad
β_M	BETM	*(planing, semi-displacement vessels)* Deadrise angle at midship section		rad
β_T	BETT	*(planing, semi-displacement vessels)* Dead rise angle at transom		rad
β_{WA}	BETWA	*(environmental mechanics, wind, sailing vessels)* apparent wind angle (relative to boat course)		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
β_{WR}	ANWIRL	*(ships, manoeuvrability)* Angle of attack of relative wind		rad
β_{WT}	BETWT	*(environmental mechanics, wind, sailing vessels)* True wind angle (relative to vessel course)		rad
β^{*}	BETS	*(ships, propulsor performance)* Effective advance angle	arctg (V_{A}/ (0.7 R ω))	rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Γ	CC	*(fluid mechanics, flow fields)* Circulation	$\int V\, ds$ along a closed line	m²/s
Γ	VD	*(fluid mechanics, flow fields)* Vortex density	Strength per length or per area of vortex distribution	m/s
Γ^n	CN	*(fluid mechanics, flow fields)* Normalized circulation	$\Gamma / (\pi D V)$ π is frequently omitted	1
γ	MR	*(ships, basic quantities)* Relative mass or weight, in English speaking called specific gravity	Mass density of a substance divided by mass density of distilled water at 4°C	1
γ	RO GAMR	*(solid body mechanics, rigid body motions)* 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_o axis	rad
γ	ANSW	*(fluid mechanics, lifting surfaces)* Sweep angle		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
$\mathit{\Delta}$	DISPF	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Displacement (buoyant) force	$g\,\rho\,\nabla$	N
$\mathit{\Delta}_{\mathrm{APP}}$	DISPFAP	*(ships, hull geometry)* Displacement force (buoyancy) of appendages	$g\,\rho\,\nabla_{\mathrm{AP}}$	N
$\mathit{\Delta}_{\mathrm{BH}}$	DISPFBH	*(ships, hull geometry)* Displacement force (buoyancy) of bare hull	$g\,\rho\,\nabla_{\mathrm{BH}}$	N
$\mathit{\Delta}C_{\mathrm{F}}$	DELCF	*(ships, hull resistance)* Roughness allowance		1
$\mathit{\Delta}_{\mathrm{C}}$	DFCAN	*(sailing vessels)* Displacement force (weight) of canoe body		N
$\mathit{\Delta}_{\mathrm{K}}$	DFK	*(sailing vessels)* Displacement force (weight) of keel		N
$\mathit{\Delta}M$	DMF	Change of momentum flux		N
$\Delta\overline{M}_x$		*(ships, hull resistance, water jets)* Change in Momentum Flux in x direction		N
$\mathit{\Delta}_m$	DISPM	*(ships, hull geometry, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Displacement mass	$\rho\,\nabla$	kg
$\mathit{\Delta}_{\mathrm{R}}$	DFR	*(sailing vessels)* Displacement force (weight) of rudder		N
$\mathit{\Delta}_U$	UDEF	*(fluid mechanics, boundary layers)* Velocity defect in boundary layer	$(U_{\mathrm{e}} - U) / u_\tau$	1
$\mathit{\Delta}w$	DELW	*(ships, performance)* Ship-model correlation factor for wake fraction	$w_{T,\mathrm{M}} - w_{T,\mathrm{S}}$	1
$\mathit{\Delta}w_{\mathrm{C}}$	DELWC	*(ships, performance)* Ship-model correlation factor with respect to $w_{T,\mathrm{S}}$ method formula of ITTC 1978 method		1
δ	DELTT	*(fluid mechanics, lifting surfaces)* Thickness ratio of foil section (general)	t / c	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
δ	ADCT	*(ships, propulsor performance)* Taylor's advance coefficient	$n D / V_A$ with n in revs/min, D in feet, V_A in kn	1
δ	D	*(ships, hydrostatics, stability)* Finite increment in...	Prefix to other symbol	1
δ		*(seakeeping, large amplitude motions capsizing)* Tank block coefficient		1
δ	ANCS	*(ships, manoeuvrability)* Angle of a control surface, rudder angle, helm angle		rad
δ	ANRU	*(ships, manoeuvrability)* Rudder angle, helm angle		rad
δ_0	ANRU0	*(ships, manoeuvrability)* Neutral rudder angle		rad
δ_1	DELS	*(fluid mechanics, boundary layers)* Displacement thickness of boundary layer	$\int (U_e - U) / U_e \, dy$	m
δ_{995}	DEL	*(fluid mechanics, boundary layers)* Thickness of a boundary layer at U=0.995U_e		m
δB_C	DBCV	*(ACV and SES)* Increase in cushion beam due to water contact		m
δ_{FB}	ANFB	*(ships, manoeuvrability)* Bow fin angle		rad
δ_B	DELTB	*(fluid mechanics, lifting surfaces)* Thickness ratio of trailing edge of struts	t_B / c_S	1
δ_C	HC	*(fluid mechanics, cavitation)* Cavity height or thickness	Maximum height of a fully-developed cavity, normal to the surface and the stream-wise direction of the cavity	m
δ_{ij}	DEL(I,J)	(*fundamental. coordinate and space related*) Delta operator	+1 : ij = 11, 22, 33 0 : if otherwise	
δ_{EFF}	ANRUEF	*(ships, manoeuvrability)* Effective rudder inflow angle		rad
δ_F	DELTF	*(fluid mechanics, lifting surfaces)* Camber ratio of mean line (general)	f / c	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
δ_F	DELFS	*(ships, appendage geometry)* Flap angle (general)	Angle between the planing surface of a flap and the bottom before the leading edge	rad
δ_{FB}	ANFB	Bow fin angle		rad
δ_{FL}	DLTFL	*(fluid mechanics, lifting surfaces)* Angle of flap deflection		rad
δ_{FR}	ANFR	*(ships, appendage geometry)* Flanking rudder angle		rad
δ_{FRin}	ANFRIN	*(ships, appendage geometry)* Assembly angle of flanking rudders	Initial angle set up during the assembly as zero angle of flanking rudders	rad
δ_{FS}	ANFS	*(ships, manoeuvrability)* Stern fin angle		rad
δ_I	ELIC	*(environmental mechanics, ice)* Deflection of ice sheet	Vertical elevation of ice surface	m
δ_L	DELTL	*(fluid mechanics, lifting surfaces)* Camber ratio of lower side of foil	f_L / c	1
δ_λ	DLAM	*(special craft, geometry and levers)* Dimensionless increase in total friction area	Effective increase in friction area length-beam ratio due to spray contribution to drag	1
δ_{max}	ANRUMX	*(ships, manoeuvrability, zig-zag manoeuvre)* Maximum value of rudder angle		rad
δ_R	ANRU	*(ships, appendage geometry, manoeuvrability)* Rudder angle		rad
δ_{RO}	ANRUOR	*(ships, manoeuvrability)* Rudder angle, ordered		rad
δ_{RF}	ANRF	*(ships, appendage geometry)* Rudder-flap angle		rad
δ_S	DELTS	*(fluid mechanics, lifting surfaces)* Thickness ratio of strut	t_S / c_S	1
δ_{STH}	DELTT	*(fluid mechanics, lifting surfaces)* Theoretical thickness ratio of section	t_S / c_{STH}	1
δ_s	ANSL	*(fluid mechanics, lifting surfaces)* Slat deflection angle		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
δt_{KL}	DTR	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Change in static trim		m
δ_U	DELTU	*(fluid mechanics, lifting surfaces)* Camber ratio of upper side	f_u / c	1
δ_u	DP(U)	*(ships, unsteady propeller forces)* Generalized vibratory displacement	u = 1,.., 6 u = 1, 2, 3: linear u = 4, 5, 6: angular	M m rad
δ_W	DELWG	*(ships, appendage geometry)* Wedge angle	Angle between the planing surface of a wedge and the bottom before the leading edge	rad
δ_λ	DLAM	*(planing, semi-displacement vessels)* Dimensionless increase in total friction area	Effective increase in friction area length-beam ratio due to spray contribution to drag	1
δ^*	DELS	*(fluid mechanics, boundary layers)* Displacement thickness of boundary layer	$\int (U_e - U) / U_e \, dy$	m
δ^{**}	ENTH	*(fluid mechanics, boundary layers)* Energy thickness	$\int (U / U_e) (1 - U^2 / U_e^2) dy$	m
$\dot{\delta}_u$	DPVL(U)	*(ships, unsteady propeller forces)* Generalized vibratory velocity	u = 1,.., 6 u = 1, 2, 3: linear u = 4, 5, 6: angular	m/s m/s rad/s
$\ddot{\delta}_u$	DPAC(U)	*(ships, unsteady propeller forces)* Generalized vibratory acceleration	u = 1,.., 6 u = 1, 2, 3: linear u = 4, 5, 6: angular	m/s^2 m/s^2 rad/s^2

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
ε	EPSLD	*(fluid mechanics, lifting surfaces)* Lift-Drag ratio	L/D	1
ε	EPSG	*(ships, hull resistance)* Resistance-displacement ratio in general	R / Δ	1
ε	PSIBP	*(ships, propulsor geometry)* Propeller axis angle measured to body fixed coordinates	Angle between reference line and propeller shaft axis	rad
ε_{F}	EPSLDF	*(hydrofoil boats)* Lift/ Drag ratio of foil	L / D	1
ε_i	EWPH(I)	Phases of harmonic components of a periodic wave	η^{FSp}	rad
ε_{ijk}	EPS(I,J,K)	(*fundamental. coordinate and space related*) Epsilon operator	+1 : ijk = 123, 231, 312 - 1 : ijk = 321, 213, 132 0 : if otherwise	
ε_{I}	STIC	*(environmental mechanics, ice)* Ice strain	Elongation per unit length	1
ε_{R}	EPSR	*(ships, hull resistance)* Residuary resistance-displacement ratio	R_{R} / Δ	1
$\varepsilon_{\mathrm{SH}}$	EPSSH	*(planing, semi-displacement vessels)* Shaft angle	Angle between shaft line and reference line (positive, shaft inclined downwards)	rad
$\varepsilon_{\mathrm{WL}}$	EPSWL	*(planing, semi-displacement vessels)* Wetted length factor	$L_{\mathrm{M}} / L_{\mathrm{WL}}$	1
$\varepsilon_{\mathrm{WS}}$	EPSWS	*(planing, semi-displacement vessels, ACV and SES)* Wetted surface area factor, wetted surface factor	S / S_0, $S_{\mathrm{SHC}} / S_{\mathrm{SH0}}$	1
$\dot{\varepsilon}_{\mathrm{I}}$	STRTIC	*(environmental mechanics, ice)* Ice strain rate	$\partial\varepsilon / \partial t$	1/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
ζ		(*fundamental, statistical, stochastic*) Outcome of a random "experiment"		
ζ	DW	*(environmental mechanics, waves)* Instantaneous wave depression	*z*-axis positive vertical down, zero at mean water level	m
ζ_{13}	ZETA13	*(ships, hull resistance, water jets)* Inlet duct loss coefficient:	$\frac{E_3 - E_1}{\frac{1}{2}\rho U_0^2}$	1
ζ_{57}	ZETA57	*(ships, hull resistance, water jets)* Nozzle duct loss coefficient:	$\frac{E_7 - E_5}{\frac{1}{2}\rho \overline{u}_{e6}^2}$	1
ζ_A	WAMP	*(environmental mechanics, waves)* Wave amplitude	Radius of orbital motion of a surface wave particle	m
ζ_C	ZETAC	*(ACV and SES)* Height of cushion generated wave above mean water plane at leading edge side of the skirt		m
ζ_{ij}		*(ships, hull resistance, water jets)* Energy loss coefficient between station *i* and *j*		1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
η	EW	*(ships, hull resistance, environmental mechanics, waves)* Instantaneous wave elevation at a given location	z-axis positive vertical up, zero at mean water level;	m
η	EF, ETA	*(ships, basic quantities)* Efficiency	Ratio of powers	
η_0		*(ships, hull resistance, water jets)* Free stream efficiency:	$\eta_P \eta_{duct} \eta_I$	1
η_{APP}	ETAAP	*(ships, performance)* Appendage efficiency	P_{Ew0APP} / P_{EwAPP}, R_{TBH} / R_T	1
$\eta^a{}_i$	EWAM(I)	*(environmental mechanics, waves)* Amplitudes of harmonic components of a periodic wave	η^{FSa}	m
η_B	ETAB, EFTP	*(ships, performance)* Propeller efficiency behind ship	$P_T / P_D = T\, V_A / (Q\, \omega)$	1
η_C	EC	*(environmental mechanics, waves)* Maximum of elevations of wave crests in a record		m
η_D	ETAD, EFRP	*(ships, performance, hull resistance, water jets)* Propulsive efficiency or quasi-propulsive coefficient	$P_E / P_D = P_R / P_P$	1
η_{duct}		*(ships, hull resistance, water jets)* Ducting efficiency:	$\frac{P_{JSE}}{P_{PE}}$	1
η_{eI}		*(ships, hull resistance, water jets)* Energy interaction efficiency:	$\frac{P_{JSE0}}{P_{JSE}}$	1
η_G	ETAG, EFGP	*(ships, performance, basic quantities)* Gearing efficiency		1
η_H	ETAH, EFRT	*(ships, performance)* Hull efficiency	$P_E / P_T = P_R / P_T$ $= (1 - t) / (1 - w)$	1
η_I	EFID	*(ships, propulsor performance)* Ideal propeller efficiency	Efficiency in non-viscous fluid	1
η_I		*(ships, hull resistance, water jets)* Ideal efficiency, equivalent to jet efficiency in free stream conditions	$\frac{P_{TE0}}{P_{JSE0}}$	1
η_{ID}	EFDIC	*(ice going vessels)* Propulsive efficiency in ice	$R_{IT}\, V / (2\, \pi\, n_{IA}\, Q_{IA})$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
η_{ICE}	ERIC	*(ice going vessels)* Relative propulsive efficiency in ice	$\eta_{\mathrm{ID}} / \eta_{\mathrm{D}}$	1
η_{INT}		*(ships, hull resistance, water jets)* Total interaction efficiency:	$\frac{\eta_{\mathrm{eI}}}{\eta_{\mathrm{mI}}}(1-t)$	1
η_{inst}	ETAIN	*(ships, hull resistance, water jets)* Installation efficiency to account for the distorted flow delivered by the jet intake to the pump		1
η_{jet}		*(ships, hull resistance, water jets)* Momentum or jet efficiency:	$\frac{P_{\mathrm{TE}}}{P_{\mathrm{JSE}}}$	1
η_{JP}	EFJP	*(ships, propulsor performance)* Propeller pump or hydraulic efficiency	$P_{\mathrm{J}} / P_{\mathrm{D}} = P_{\mathrm{J}} / P_{\mathrm{P}}$	1
η_{JP0}	ZET0, EFJP0	*(ships, propulsor performance)* Propeller pump efficiency at zero advance speed, alias static thrust coefficient	$T / (\rho\, \pi / 2)^{1/3} / (P_{\mathrm{D}}\, D)^{2/3}$	1
η_{JS}		*(ships, hull resistance, water jets)* Jet system efficiency:	$\frac{P_{\mathrm{JSE}}}{P_{\mathrm{D}}}$	1
η_{M}	ETAM	Mechanical efficiency of transmission between engine and propeller	$P_{\mathrm{D}} / P_{\mathrm{B}}$	1
η_{mI}		*(ships, hull resistance, water jets)* Momentum interaction efficiency:	$\frac{T_{\mathrm{net0}}}{T_{\mathrm{net}}}$	1
η_{O}	ETAO, EFTPO	*(ships, propulsor performance, performance)* Propeller efficiency in open water	$P_{\mathrm{T}} / P_{\mathrm{D}} = T\, V_{\mathrm{A}} / (Q\, \omega)$ all quantities measured in open water tests	1
η_{P}	ETAP	*(ships, performance)* Propulsive efficiency coefficient	$P_{\mathrm{E}} / P_{\mathrm{B}}$	1
η_{P}	ETAP	*(ships, hull resistance, water jets)* Pump efficiency	$\frac{P_{\mathrm{PE}}}{P_{\mathrm{D}}}$	1
η_{P0}		*(ships, hull resistance, water jets)* Pump efficiency from a pump loop test		1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
η^{p}_{i} , ε_i	EWPH(I)	*(environmental mechanics, waves)* Phases of harmonic components of a periodic wave	η^{FSp}	rad
η_{R}	ETAR, EFR0	*(ships, performance)* Relative rotative efficiency	$\eta_{\mathrm{B}} / \eta_0$	1
η_{S}	ETAS, EFPS	*(ships, performance)* Shafting efficiency	$P_{\mathrm{D}} / P_{\mathrm{S}} = P_{\mathrm{P}} / P_{\mathrm{S}}$	1
η_{T}	ET	*(environmental mechanics, waves)* Wave trough depression	Negative values!	m
η_{T}	ET	*(environmental mechanics, waves)* Elevations of wave troughs in a record	Negative values!	m
η_{TJ}	EFTJ	*(ships, propulsor performance)* Propeller jet efficiency	$2 / (1 + (1 + C_{Th})^{1/2})$	1
η_{TP0}	ETA0, EFTP0	*(ships, propulsor performance)* Propeller efficiency in open water	$P_{\mathrm{T}} / P_{\mathrm{D}} = T\, V_{\mathrm{A}} / (Q\, \omega)$ all quantities measured in open water tests	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Θ	THETA	*(fluid mechanics, boundary layers)* Momentum thickness	$\int(U / U_e)(1 - U / U_e)dy$	m
θ	X(5), TR, TETP	*(solid body mechanics, rigid body motions)* Angle of pitch or trim	Positive in the positive sense of rotation about the y-axis	rad
θ	CWD	*(environmental mechanics, waves)* Component wave direction		rad
θ	PI	*(ships, manoeuvrability)* Pitch angle		rad
θ	RAKA	*(ships, propulsor geometry)* Angle of rake		rad
θ_0	TRIMS	*(planing, semi-displacement vessels)* Static trim angle	Angle between ship design waterline and actual water line at rest (positive bow up) $\tan^{-1}((z_{SF} - z_{SA}) / L)$	rad
θ_B	TETB	*(ACV and SES)* Bag contact deformation angle		rad
θ_C		*(seakeeping, large amplitude motions capsizing)* Capsizing angle under the action of a gust of wind IMO/IS		rad
θ_D	TRIMV	*(ships, hull resistance, planing, semi-displacement vessels)* Running (dynamic) trim angle	Angle between actual water line at rest and running water line (positive bow up) $\tan^{-1}((z_{VF} - z_{VA}) / L)$	rad
θ_{DH}	DIHED	*(hydrofoil boats)* Dihedral angle		rad
θ_{DWL}	TRIMDWL	*(planing, semi-displacement vessels)* Running trim angle based on design waterline	Angle between design waterline and running waterline (positive bow up)	rad
θ_{EXT}	TEMX	*(ships, propulsor geometry)* Skew angle extent	The difference between maximum and minimum local skew angle	rad
θ_F	TETF	*(ACV and SES)* Finger outer face angle		rad
θ_f	HEELANGF	*(seakeeping, large amplitude motions capsizing)* Heel angle at flooding		rad
θ_m	MWD THETAMOX	*(environmental mechanics, waves)* Mean or dominant wave direction		rad
θ_n		*(ships, hull resistance, water jets)* Jet angle relative to the		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
		horizontal at the nozzle (station 6)		
θ_S	TRIMS	*(ships, hydrostatics, stability, planing, semi-displacement vessels, seakeeping, large amplitude motions capsizing)* Static trim angle	Angle between ship design waterline and actual water line at rest (positive bow up) $\tan^{-1}((z_{SF} - z_{SA}) / L)$	rad
θ_s	TETS	*(ships, propulsor geometry)* 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 ahead rotation	rad
θ_V	TRIMV	*(ships, hull resistance, planing, semi-displacement vessels)* Running (dynamic) trim angle	Angle between actual water line at rest and running water line (positive bow up) $\tan^{-1}((z_{VF} - z_{VA}) / L)$	rad
θ_W	TETW	*(ACV and SES)* Slope of mean water plane for surface level beneath cushion periphery		rad
θ_W	TETWI	*(environmental mechanics, wind)* Wind direction		rad
θ^*	ENTH	*(fluid mechanics, boundary layers)* Energy thickness	$\int (U / U_e)(1 - U^2 / U_e^2)dy$	m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
K	K	*(fluid mechanics, boundary layers)* von Karman constant	0.41	1
κ	CK	*(fluid mechanics, flow parameter)* Kinematic capillarity	σ / ρ	m^3/s^2
κ	WN	*(environmental mechanics, waves)* Wave number	$2 \pi / L_W = \omega^2/g$	1/m
κ_S	KS	*(ships, propulsor performance)* Roughness height of propeller blade surface		m

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
Λ	AS	*(fluid mechanics, lifting surfaces)* Aspect ratio	b^2 / A	1
Λ	PRGR	*(fluid mechanics, boundary layers)* Pressure gradient parameter	$\delta_{995} / (\nu\, dU_e / dx)$	1
Λ		Tuning factor	$\Lambda_z = \frac{\omega_E}{\omega_z} \quad \Lambda_\theta = \frac{\omega_E}{\omega_\theta} \quad \Lambda_\phi = \frac{\omega_E}{\omega_\varphi}$ $\Lambda_z = \frac{\omega_E}{\omega_z} \quad \Lambda_\theta = \frac{\omega_E}{\omega_\theta} \quad \Lambda_\phi = \frac{\omega_E}{\omega_\varphi}$ or $\Lambda_z = \frac{T_z}{T_E} \quad \Lambda_\theta = \frac{T_\theta}{T_E} \quad \Lambda_\phi = \frac{T_\varphi}{T_E}$	1
Λ_{FR}	ASRF	*(ships, appendage geometry)* Flanking rudder aspect ratio		1
Λ_R	ASRU	*(ships, appendage geometry, manoeuvrability)* Rudder aspect ratio	b^2 / A, b_R^2 / A_R, b_R^2 / A_{RT}	1
λ	TA	*(fluid mechanics, lifting surfaces)* Taper ratio	c_t / c_r	1
λ	SC	*(ships, basic quantities, ships, hull geometry)* Scale ratio, Linear scale of ship model	Ship dimension divided by corresponding model dimension $\lambda = L_S / L_M = B_S / B_M$ $= T_S / T_M$	1
λ	ADR	*(ships, propulsor performance)* Advance ratio of a propeller	$V_A / (n D) / \pi = J / \pi$	1
λ_d	LD	*(environmental mechanics, waves)* Wave length by zero down-crossing	The horizontal distance between adjacent down crossing in the direction of advance	m
λ_{FR}	TAFR	*(ships, appendage geometry)* Flanking rudder taper		1
λ_R	TARU	*(ships, appendage geometry)* Rudder taper	c_R / c_T	1
λ_u	LU	*(environmental mechanics, waves)* Wave length by zero up-crossing	The horizontal distance between adjacent up crossing in the direction of advance	m
λ_W	LW	*(environmental mechanics, waves)* Wave length	The horizontal distance between adjacent wave crests in the direction of advance	m
λ_W	LAMS	*(planing, semi-displacement vessels)* Mean wetted length-beam ratio	$L_M / (B_{LCG})$	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
μ	VI	*(fluid mechanics, flow parameter)* Viscosity		kg/ms
μ	CWD	*(environmental mechanics, waves)* Component wave direction		rad
μ	PMVO	*(ships, hydrostatics, stability, seakeeping, large amplitude motions capsizing)* Volumetric permeability	The ratio of the volume of flooding water in a compartment to the total volume of the compartment	1
μ		*(ships, seakeeping)* Wave encounter angle	Angle between ship positive *x* axis and positive direction of waves (long crested) or dominant wave direction (short crested)	rad
μ_I	POIIC	*(environmental mechanics, ice)* Poisson's ratio of ice		1
μ_p		Expectation or mean of the probability distribution	Expectation or mean of the probability distribution of random-varying quantity *q*	
μ_x	*X*MR	(*fundamental, statistical*) Expectation or population mean of a random quantity	$E(x)$	
μ	WD	Wave direction	The angle between the direction of a component wave and the x_0 axis	rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit

ν	VK	*(fluid mechanics, flow parameter)* Kinematic viscosity	μ / ρ	m^2/s
ν		Degrees of freedom (general)		
ν_{eff}		Effective degrees of freedom	Effective degrees of freedom of $u_c(y)$ used to obtain $t_p(\nu_{eff})$ for calculating expanded uncertainty U_p	
νi		*(rigid body motion)* Degrees of freedom	Degrees of freedom, or effective degrees of freedom of standard uncertainty u(xi) of input estimate xi	
$v^0{}_1$, v_4	V0(1), V(4)	*(rigid body motion)* Rotational velocity around body axis x		rad/s
$v^0{}_2$, v_5	V0(2), V(5)	*(rigid body motion)* Rotational velocity around body axis y		rad/s
$v^0{}_3$, v_6	V0(3), V(6)	*(rigid body motion)* Rotational velocity around body axis z		rad/s
$v^1{}_1$, v_1	V1(1), V(1)	*(rigid body motion)* Translatory velocity in the direction of body axis x		m/s
v , v_y , $v^1{}_2$, v_2	V, VY, V1(2), V(2)	*(rigid body motion)* Translatory velocity in the direction of body axis y		m/s
v_z $v^1{}_3$, v_3	VZ, V1(3), V(3)	*(rigid body motion)* Translatory velocity in the direction of body axis z		m/s
v_i	V(I)	Any vector quantities		

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
π	PI	Circular constant	3.1415926535	1

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
ρ	DN, RHO	*(fluid mechanics, flow parameter, ships, basic quantities, seakeeping, large amplitude motions capsizing, hull resistance, water jets)* Mass density of fluid	dm / dV	kg/m^3
ρ_0	RHO0	*(ships, basic quantities, sailing vessels)* water density for reference water temperature and salt content		kg/m3
ρ_A	DNA, RHOA	*(Ships, basic quantities, ACV and SES, seakeeping, large amplitude motions capsizing)* Mass density of air	Mass of air per unit volume	kg/m^3
ρ_I	DNIC	*(environmental mechanics, ice)* Mass density of ice	Mass of ice per unit volume	kg/m^3
ρ_SN	DNSN	*(environmental mechanics, ice)* Mass density of snow	Mass of snow per unit volume	kg/m^3
ρ_W	DNWA	*(environmental mechanics, ice)* Mass density of water		kg/m^3
ρ_Δ	DNWI	*(environmental mechanics, ice)* Density difference	$\rho_\Delta = \rho_\mathrm{W} - \rho_\mathrm{I}$	kg/m^3

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
σ	CA	*(fluid mechanics, flow parameter)* Capillarity	Surface tension per unit length	kg/s^2
σ	CNPC	*(fluid mechanics, cavitation)* Cavitation number	$(p_A - p_C) / q$	1
σ	SN, SIGS	*(ships, basic quantities)* Normal stress		Pa
σ	FC	*(environmental mechanics, waves)* Circular wave frequency	$2 \pi f_W = 2 \pi / T_W$	rad/s
σ		Standard deviation of a probability distribution	Standard deviation of a probability distribution, equal to the positive square root of σ^2	
σ_{CI}	SCIC	*(environmental mechanics, ice)* Compressive strength of ice		Pa
σ_{FI}	SFIC	*(environmental mechanics, ice)* Flexural strength of ice		Pa
σ_I	CNPI	*(fluid mechanics, cavitation)* Inception cavitation number		1
σ_{TI}	SNIC	*(environmental mechanics, ice)* Tensile strength of ice		Pa
σ_V	CNPV	*(fluid mechanics, cavitation)* Vapour cavitation number	$(p_A - p_V) / q$	1
σ_x	*X*DR	(*fundamental, statistical*) Standard deviation of a random quantity	$x^{VR\ ½}$	
σ_θ	DIRSF SIGMAOX	*(environmental mechanics, waves)* Directional spreading function	$S(f,\theta)=S(f)D_X(f,\theta)$ where $\int_0^{2\pi} D_X(f,\theta)d\theta = 1$	rad
$\sigma(\bar{q})$		Standard deviation of $\bar{q}$	Standard deviation of $\bar{q}$, equal to the positive root of $\sigma^2(\bar{q})$	
$\sigma\left[s(\bar{q})\right]$		Standard deviation of experimental standard deviation $s(\bar{q})$ of $\bar{q}$, equal to the positive square root of $\sigma^2\left[s(\bar{q})\right]$		

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
σ^2		Variance of a probability	Variance of a probability distribution of (for example) a randomly-variing quantity q, estimated by $s^2(q_k)$	
$\sigma^2\left(\overline{q}\right)$		Variance of $\overline{q}$	Variance of $\overline{q}$, equal to σ^2 / n, estimated by $s^2\left(\overline{q}\right)=\frac{s^2\left(q_k\right)}{n}$	
$\sigma^2\left[s\left(\overline{q}\right)\right]$		Variance of experimental standard deviation $s\left(\overline{q}\right)$ of $\overline{q}$		

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
τ	TICV	(*fundamental, statistical, stochastic*) Covariance or correlation time		s
τ	ST, TAU	*(ships, basic quantities)* Tangential stress		Pa
τ	TMR	*(ships, propulsor performance)* Ratio between propeller thrust and total thrust of ducted propeller	T_P / T_T	1
τ_B		*(ships, propulsor geometry)* Blade thickness ratio	t_0 / D	1
τ	TRIMDWL	*(special craft, Planing and Semi-Displacement Vessels)* Running trim angle based on design waterline	Angle between design waterline and running waterline (positive bow up)	deg
τ_{DWL}	TAUDWL	*(planing, semi-displacement vessels)* Reference line angle	Angle between the reference line and the design waterline	rad
τ_R	TAUR	*(planing, semi-displacement vessels)* Angle of attack relative to the reference line	Angle between the reference line and the running waterline	rad
τ_{SI}	STIC	*(environmental mechanics, ice)* Shear strength of ice		Pa
τ_W	LSF, TAUW	*(ships, hull resistance, fluid mechanics, flow fields)* Local skin friction, Wall shear stress	$\mu\ (\partial U / \partial y)_{y=0}$	Pa

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
ϕ	HEELANG	*(seakeeping, large amplitude motions capsizing)* Heel angle		rad
φ	X(4), RO, PHIR	*(solid body mechanics, rigid body motions)* Angle of roll, heel or list	Positive in the positive sense of rotation about the x-axis	rad
φ	HEELANG	*(ships, hydrostatics, stability)* Heel angle		rad
φ	RO	*(ships, manoeuvrability)* Roll angle		rad
ϕ_0		*(seakeeping, large amplitude motions capsizing)* Heel angle during offset load tests		rad
$\phi_{0(PMT)}$		*(seakeeping, large amplitude motions capsizing)* Maximum permitted heel angle during …		rad
$\phi_{0(REQ)}$		*(seakeeping, large amplitude motions capsizing)* Maximum permitted heel angle during …		rad
ϕ_D		*(seakeeping, large amplitude motions capsizing)* Actual down flooding angle according to …		rad
$\phi_{D(REQ)}$		*(seakeeping, large amplitude motions capsizing)* Required down flooding angle, see…		rad
ϕ_{DC}		*(seakeeping, large amplitude motions capsizing)* Down flooding angle to non-quick draining cockpits		rad
ϕ_{DH}		*(seakeeping, large amplitude motions capsizing)* Down flooding angle to any main access hatchway		rad
ϕ_F	HEELANGF	*(ships, hydrostatics, stability seakeeping, large amplitude motions capsizing)* Heel angle at flooding		rad
ϕ_{GZMAX}		*(seakeeping, large amplitude motions capsizing)* Angle of heel at which maximum righting moment occurs		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
ϕ_{m}		Heel angle corresponding to the maximum of the statical stability curve		rad
ϕ_{R}		*(seakeeping, large amplitude motions capsizing)* Assumed roll angle in a seaway		rad
ϕ_{VS}	HEELANGV	*(ships, hydrostatics, stability)* Heel angle for vanishing stability		rad
ϕ_{W}		*(seakeeping, large amplitude motions capsizing)* Heel angle due to calculation wind		rad
φ	PHIP	*(ships, propulsor geometry)* Pitch angle of screw propeller	arctg $(P / (2 \pi R))$	rad
φ	PO	*(fluid mechanics, flow fields)* Potential function		m^2/s
φ_{F}	PHIF	*(ships, propulsor geometry)* Pitch angle of screw propeller measured to the face line		rad
φ_{SP}	PHISP	*(planing, semi-displacement vessels)* Spray angle	Angle between stagnation line and keel (measured in plane of bottom)	rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
χ	YX	Yaw angle		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
ψ	X(6), YA, PSIY	*(solid body mechanics, rigid body motions, ships, manoeuvrability)* Angle of yaw, heading or course	Positive in the positive sense of rotation about the z-axis	rad
ψ	SF	*(fluid mechanics, flow fields)* Stream function	ψ = const is the equation of a stream surface	m^3/s
Ψ_O	YAOR	*(ships, manoeuvrability)* Original course		rad
ψ_{01}	PSI01	*(ships, manoeuvrability, zig-zag man..)* First overshoot angle		rad
ψ_{02}	PSI02	*(ships, manoeuvrability, Zig-zag man..)* Second overshoot angle		rad
ψ^{aP}	PSIAP	*(ships, propulsor geometry)* Propeller axis angle measured to space fixed coordinates	Angle between horizontal plane and propeller shaft axis	rad
ψ^{bP}	PSIBP	*(ships, propulsor geometry)* Propeller axis angle measured to body fixed coordinates	Angle between reference line and propeller shaft axis	rad
ψ_C	COCU	*(ships, manoeuvrability)* Course of current velocity		rad
ψ_S	PSIS	*(ships, manoeuvrability, zig-zag man..)* Switching value of course angle		rad
ψ_{WA}	COWIAB	*(ships, manoeuvrability)* Absolute wind direction		rad
ψ_{WR}	COWIRL	*(ships, manoeuvrability)* Relative wind direction		rad

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit

ω	FC, OMF	*(ships, basic quantities)* Circular frequency	$2\ \pi\ f$	1/s
ω	V0, OMN	*(ships, basic quantities)* Rotational velocity	$2\ \pi\ n$	rad/s
ω	V0P	*(ships, propulsor performance)* Propeller rotational velocity	$2\ \pi\ n$	1/s
ω_{E}	FE	*(environmental mechanics, waves)* Circular wave frequency of encounter	$2\ \pi\ f_{\mathrm{E}} = 2\ \pi\ /\ T_{\mathrm{E}}$	rad/s
ω_{W}	FC	*(environmental mechanics, waves)* Circular wave frequency	$2\ \pi\ f_{\mathrm{W}} = 2\ \pi\ /\ T_{\mathrm{W}}$	rad/s
ω_x	P, OMX, V0(1), V(4)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis x		rad/s
ω_y	Q, OMY, V0(2), V(5)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis y		rad/s
ω_z	R, OMZ, V0(3), V(6)	*(solid body mechanics, rigid body motions)* Rotational velocity around body axis z		rad/s

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
∇	DISPVOL	*(ships, hull geometry, hydrostatics, stability,)* Displacement volume	$\Delta / (\rho g) = \nabla_{BH} + \nabla_{AP}$	m^3
∇_{APP}	DISPVAP	*(ships, hull geometry)* Displacement volume of appendages	$\Delta_{AP} / (\rho g)$	m^3
∇_{BH}	DISPVBH	*(ships, hull geometry)* Displacement volume of bare hull	$\Delta_{BH} / (\rho g)$	m^3
∇_C	DVCAN	*(sailing vessels)* Displaced volume of canoe body		m^3
∇_F	DISVF	*(hydrofoil boats)* Foil displacement volume		m^3
∇_{fw}	DISVOLFW	*(ships, hydrostatics, stability)* Displacement volume of flooded water	$\Delta f_w / (\rho g)$	m^3
∇_K	DVK	*(sailing vessels)* Displaced volume of keel		m^3
∇_R	DVR	*(sailing vessels)* Displaced volume of rudder		m^3

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
0		*(ships, hydrostatics, stability)* Initial		
A		*(ships, hydrostatics, stability)* attained		
a		*(ships, hydrostatics, stability)* apparent		
AB		*(ships, hull geometry)* After body		
AP		*(ships, hull geometry)* After perpendicular		
APP		*(ships, hull geometry)* Appendages		
att		*(ships, hydrostatics, stability)* attained		
BH		*(ships, hull geometry)* Bare hull		
BK		*(ships, appendage geometry)* Bilge keel		
BS		*(ships, appendage geometry)* Bossing		
D		*(ships, propulsor geometry)* Duct		
d		*(ships, hydrostatics, stability)* dynamic		
DW		*(ships, hull geometry)* Design waterline		
dyn		*(ships, hydrostatics, stability)* dynamic		
e		*(ships, hydrostatics, stability)* effective		
eff		*(ships, hydrostatics, stability)* effective		
EN		*(ships, hull geometry)* Entry		
f		*(ships, hydrostatics, stability)* false		
FB		*(ships, hull geometry)* Fore body		
FB		*(ships, appendage geometry)* Bow foil		
FP		*(ships, hull geometry)* Fore perpendicular		
FR		*(ships, appendage geometry)* Flanking rudder		
FS		*(ships, hull geometry)* Frame spacing		

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
FS		*(ships, appendage geometry)* Stern foil		
FW		*(ships, hull resistance)* Fresh water		
HE		*(ships, hull geometry)* Hull		
KL		*(ships, appendage geometry)* Keel		
KL		*(ships, hydrostatics, stability)* keel line		
L		*(ships, hydrostatics, stability)* longitudinal		
LR		*(ships, hull geometry)* Reference Line		
LP		*(ships, hull geometry)* Based on L_{PP}		
LW		*(ships, hull geometry)* Based on L_{WL}		
M		*(General)* Model		
MAX		*(ships, hydrostatics, stability)* maximum		
MF		*(ships, hull resistance)* Faired model data		
MR		*(ships, hull resistance)* Raw model data		
MS		*(ships, hull geometry)* Midship		
MTL		*(ships, hydrostatics, stability)* longitudinal trimming moment		
OW		*(ships, hull resistance)* Open water		
P		*(ships, propulsor geometry)* propeller shaft axis		
PB		*(ships, hull geometry)* Parallel body		
PMT		*(ships, hydrostatics, stability)* Permitted		
R		*(ships, hydrostatics, stability)* required (to be clarified)		
req		*(ships, hydrostatics, stability)* required (to be clarified)		
RF		*(ships, appendage geometry)* Rudder flap		
RU		*(ships, hull geometry)* Run		
RU		*(ships, appendage geometry)* Rudder		

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
S		*(General)* Ship		
S		*(ships, hydrostatics, stability)* Sinkage, squat		
s		*(ships, hydrostatics, stability)* Static		
sqt		*(ships, hydrostatics, stability)* Sinkage, squat		
SA		*(ships, appendage geometry)* Stabilizer		
SF		*(ships, hull resistance)* Faired full scale data		
SH		*(ships, appendage geometry)* Shafting		
SK		*(ships, appendage geometry)* Skeg		
SR		*(ships, hull resistance)* Raw full scale data		
SS		*(ships, hull geometry)* Station spacing		
ST		*(ships, appendage geometry)* Strut		
SW		*(ships, hull resistance)* Salt water		
T		*(ships, hydrostatics, stability)* transverse		
TC		*(ships, hydrostatics, stability)* Trim in cm		
TM		*(ships, hydrostatics, stability)* Trim in m		
TH		*(ships, appendage geometry)* Thruster		
V		*(ships, hydrostatics, stability)* vertical		
WG		*(ships, appendage geometry)* Wedge		
WP		*(ships, hull geometry)* Water plane		
WS		*(ships, hull geometry)* Wetted surface		
φ		*(ships, hydrostatics, stability)* at heel angle φ		
θ		*(ships, hydrostatics, stability)* at trim angle θ		

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
A		(*fundamental, statistical, stochastic*) Average, sample mean		
CR		(*fundamental, statistical, stochastic*) Population co-variance		
CS		(*fundamental, statistical, stochastic*) Sample covari-ance		
D		(*fundamental, statistical, stochastic*) Population devia-tion		
DR		(*fundamental, statistical, stochastic*) Population devia-tion		
DS		(*fundamental, statistical, stochastic*) Sample deviation		
E, M, MR		(*fundamental, statistical, stochastic*) Expectation, population mean		
M		(*fundamental, statistical, stochastic*) Expectation, population mean		
MR		(*fundamental, statistical, stochastic*) Expectation, population mean		
MS		(*fundamental, statistical, stochastic*) Average, sample mean		
PD		(*fundamental, statistical, stochastic*) Probability den-sity		
PF		(*fundamental, statistical, stochastic*) Probability func-tion		
S		(*fundamental, statistical, stochastic*) (Power) Spec-trum		
SS		(*fundamental, statistical, stochastic*) Sample spectrum		
R		(*fundamental, statistical, stochastic*) Population corre-lation		

ITTC Symbol	Computer Symbol	Name	Definition or Explanation	SI-Unit
RR		(*fundamental, statistical, stochastic*) Population correlation		
RS		(*fundamental, statistical, stochastic*) Sample correlation		
V		(*fundamental, statistical, stochastic*) Population variance		
VR		(*fundamental, statistical, stochastic*) Population variance		
VS		(*fundamental, statistical, stochastic*) Sample variance		