

Variables and units in Ocean 420

u zonal velocity (east-west) m/s
 v meridional velocity (north-south) m/s
 w vertical velocity (up-down) m/s
 t time s
 x east-west location m
 y north-south location m
 z vertical location (positive up) m
 J friction coefficient ($1/s$)
 p pressure N/m^2 or $kg/s^2/m$
 τ stress N/m^2 or $kg/s^2/m$
 ρ density kg/m^3
 h thickness m
 H depth m
 Q heat flux $Watts/m^2$
 C_p specific heat
 C phase speed m/s
 C_g group velocity m/s
 k wave number $1/m$
 ω frequency $1/s$
 Λ wavelength m
 T period s
 ν kinematic viscosity m^2/s
 μ dynamic viscosity $kg/m/s$
 κ diffusivity m^2/s
 α thermal expansion coefficient $1/^\circ C$
 k von Karman's constant *no units*
 C_D drag coefficient *unitless*
 T temperature $^\circ C$
 S salinity *parts/thousand*
 η sea surface height m
 g gravitational constant m/s^2
 a amplitude of wave in sea surface height m
 f Coriolis parameter $1/s$
 ψ stream function m^2/s
 θ latitude *radians*
 D dynamic height m
 i slope of isopycnals *unitless*
 u_* friction velocity m/s
 J frictional parameter $1/s$
 m_0 fudge factor *unitless*
 ΔT Temperature difference between mixed-layer and water below $^\circ C$
 E Energy density in surface gravity wave J/m^2

Some constants

k Von Karman's constant 0.4 (no dimensions)

Ω Rotation rate of the Earth $= 7.292 \times 10^{-5} \text{ s}^{-1}$

R_e Radius of the Earth = 6370 km

g gravitational acceleration 9.8 m/s²

ρ_A Density of air $1.3 \text{ kg} / \text{m}^3$

ρ_0 Density of ocean $1025 \text{ kg} / \text{m}^3$

C_D Typical drag coefficient 1.5×10^{-3} (no dimensions)

Distance in one degree of latitude 111 km

m_0 fudge factor 1.25 (no dimensions)

$C_p = 4217 \text{ J} / \text{kg} / \text{K}$ specific heat.

α thermal expansion coefficient $1 / ^\circ \text{C}$ for 28C water 0.0032