

# Manual for Package: physics

## Revision 1:9M

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## 1 @Physics

### 1.1 Physics

Physics and physical standard quantities

### 1.2 air\_pressure

### 1.3 beam\_bending\_deflection

### 1.4 beam\_bending\_moment

### 1.5 beam\_bending\_strain

### 1.6 beam\_bending\_stress

### 1.7 bolt\_stress

### 1.8 celsius\_to\_kelvin

convert temperature from degree Celsius to Kelvin  
function t\_K = celsius\_to\_kelvin(t\_C)

### 1.9 depth\_to\_pressure

convert depth to pressure in fresh water at standard temperature

$$z = (p - p_0) / (\rho \cdot g)$$
$$\Rightarrow p = \rho \cdot g \cdot z + p_0$$

input :

p0 : nx1 or scalar, pressure at water surface in BAR  
d : depth in metre

output :

p : nx1, pressure at measurement depth in BAR

1.10 drag\_force

1.11 evapotranspiration\_blaney

1.12 heat\_convection\_through\_orifice

1.13 heat\_transfer

1.14 kelvin\_to\_celsius

convert temperature degree Kelvin to Celsius

1.15 minimum\_cable\_diameter

1.16 moment\_of\_inertia\_rectangle

1.17 moment\_of\_inertia\_ring

1.18 optical\_attenuation

1.19 parabolic\_reflector\_gain

## 1.20 pressure\_to\_depth

convert pressure to depth in fresh water at standard temperature

$$z = (p - p_0)/(\rho \cdot g)$$

input:

p : nx1, pressure at measurement depth in BAR

p0 : nx1 or scalar, pressure at water surface in BAR

output:

d : depth in metre

## 1.21 saturation\_vapor\_pressure

## 1.22 sound\_absorption\_air

## 1.23 sound\_absorption\_water

sound absorption in water

following Francois and Garrison, 1982

function alpha = sound\_absorption(f,S,D,T)

input:

f : frequency (Hz)

S : salinity

D : depth (m)

T : temperature (degree C)

output:

alpha = sound attenuation in dB/m (not dB/km)

function alpha = sound\_absorption(f,S,D,T,model)

## 1.24 sound\_velocity\_water

sound velocity in water  
following Lubbers and Graaff (1998)  
this formula does not include depth and salinity effects

## 1.25 thermal\_flux

## 1.26 viscosity\_dynamic\_water

## 1.27 viscosity\_kinematic\_water

# 2 hydrogen-spectrum

## 2.1 hydrogen\_spectrum\_1d

## 2.2 hydrogen\_spectrum\_2012\_12\_02

## 2.3 hydrogen\_spectrum\_2d

## 2.4 hydrogen\_spectrum\_3d

### 3 salinity

#### 3.1 Salinity

#### 3.2 Salinity78

#### 3.3 canter\_cremer\_number

Canter Cremer Number

ratio of fresh water to sea water that flows into the estuary

Qf : fresh water discharge

T : tidal period

Pt : tidal prism

Savenije, Salinity and tides, eq. 1.1, 2.35 and 5.67

#### 3.4 density2salinity

#### 3.5 dispersion\_hws\_savenije

Dispersion at river mouth during high water slack

v0 : tidal velocity scale

E0 : tidal excursion

h0 : depth

a : convergence length

Nr : Richargson Number

Savenije 1993c, Savenije, Salinity and Tides, eg. 5.70

#### 3.6 dispersion\_tda\_burgh

### 3.7 richardson\_number

Estuarine Richardson Number  
potential energy due to mixing the entire fresh water with sea  
water  
ratio of potential energy and buoyancy  
Savenije, Salinity and Tides, 2.36  
drho : difference of sea water and fresh water density  
rho : fresh water density  
h : depth  
v : tidal velocity scale  
N : Cramer number

### 3.8 salinity

### 3.9 salinity\_intrusion\_length

### 3.10 sea\_water\_density

### 3.11 tidal\_discharge

specific tidal discharge (discharge per unit width)

### 3.12 tidal\_excursion

Tidal excursion length  
Pt : tidal prism  
h0 : depth  
w0 : width



### 3.13 tidal\_prism\_channel

Tidal prism  
 $P_t = \int_{lsw}^{hws} Q_t dt \sim A E$   
z1 : tidal amplitude  
w0 : width of estuary at mouth  
b : length of width convergence  
dH\_dx = rate of damping of H  
c.f. Savenije 2.34, 2.64

### 3.14 tidal\_prism\_estuary

Tidal prism  
 $P_t = \int_{lsw}^{hws} Q_t dt \sim A E$   
z1 : tidal amplitude  
w0 : width of estuary at mouth  
b : length of width convergence  
dH\_dx = rate of damping of H  
c.f. Savenije 2.34, 2.64

### 3.15 tidal\_velocity

## 4 physics

### 4.1 test\_sound\_absorption\_air

## 5 turbulence

### 5.1 keps2nu

## 6 wind-wave

### 6.1 short\_wave\_length

**6.2** short\_wave\_shear\_velocity

**6.3** wave\_height\_from\_wind\_speed