

# Manual for Package: sediment-transport

## Revision 1:4M

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## 1 t/@Hermite\_profile

### 1.1 Hermite\_profile

suspended sedimen profile in form of a hermite polynomial

### 1.2 fit

fit suspended sediment profile

### 1.3 predict

predict suspended sediment concentration

### 1.4 regmtx

regression matrix

### 1.5 transform

hermite profile

## 2 t/@Nodal\_Point

### 2.1 Adot

ODE of the nodal point relation (time-derivative of branch cs-area)

### 2.2 Nodal\_Point

Nodal point relation for bifurcations, according to Wang

### 2.3 Qs\_in

sediment entering branches

### 2.4 Qs\_out

sediment leaving branches

### 2.5 derive\_jacobian

derive Jacobian of the nodal point relation

## **2.6 discharge**

discharge through branches

## **2.7 geometry**

cross section geometry of branches

## **2.8 jacobian**

jacobian of the nodal point relation  
semi-autogenerated

## **2.9 phase\_diagram**

phase diagram

## **2.10 phase\_diagram\_wang**

phase diagram of Nodal point relation

## **2.11 solve**

solve the nodal point relation for critical points

## **2.12 stability\_analysis**

stability analysis for a given configuration

# **3 t/@Parabolic\_Constant\_Profile**

## **3.1 Parabolic\_Constant\_Profile**

parabolic-constant profile

### 3.2 fit

fit the suspended sediment concentration profile

### 3.3 predict

predict suspended sediment concentration

### 3.4 regmtx

regression matrix

### 3.5 transform

transformation of vertical coordinate

## 4 t/@Rouse\_Profile

### 4.1 Rouse\_Profile

suspended sediment concentration profile

### 4.2 fit

fit the suspended sediment concentration profile

### 4.3 predict

predict the suspended sediment concentration

### 4.4 regmtx

regression matrix

#### 4.5 rouse\_number

rouse number (suspension number) for given grain size and shear velocity

#### 4.6 rouse\_number\_to\_grain\_diameter

convert known rouse number (suspension parameter) to grain size diameter

#### 4.7 set\_parameters

#### 4.8 transform

transform the vertical coordinate

### 5 t

#### 5.1 Exponential\_SSC\_Profile

#### 5.2 adaptation\_length\_bed

adaptation length of bed morphology

#### 5.3 adaptation\_length\_flow

adaptation length of the flow

#### 5.4 bar\_mode\_crosato

bar mode of a river according to crosato

## 5.5 `bed_layer_thickness`

## 5.6 `bed_load_einstein`

bed load transport according to einstein jr.

## 5.7 `bed_load_engelund_fredsoe`

bed load transport according to engelund and fredsoe

## 5.8 `bed_load_transport_mpm`

bed load transport rate according to meyer-peter-mueller

## 5.9 `bed_load_transport_rijn`

bed load transport  
method of van Rijn (1984)

```
function [Q_b q_b Phi_b] = bed_load_transport_rijn(C,d50,d90,U,d,b)
```

d50 [mm] (converted to m)

d90 [mm] (converted to m)

d : depth

b : width

## 5.10 `bed_load_transport_wu`

bed load transport according to Wu

## 5.11 `bedform_dimension_rijn`

bed form dimensions  
cf. rijn 1984 iii



## 5.12 bedform\_roughness\_rijn

form drag according to van Rijn

## 5.13 bedload\_direction

bedload transport direction

## 5.14 bifurcation\_critical\_aspect\_ratio

critical aspect ratio of a bifurcation  
c.f. redolfi and pittaluga

## 5.15 chezy\_einstein

chezy coefficient according to Einstein

## 5.16 chezy\_roughness\_engelund\_fredsoe

chezy roughness according to engelund and fredsoe

## 5.17 chezy\_to\_manning

convert chezy to manning

## 5.18 critical\_grain\_size

critical grain size for a given shear velocity

## 5.19 critical\_shear\_stress

critical shear Stress

## 5.20 critical\_shear\_stress\_ratio

critical shields parameter  
aka critical shear stress ratio  
aka shields curve

## 5.21 critical\_shear\_stress\_wu

critical shear stress, according to wu

## 5.22 critical\_shear\_velocity

critical shear velocity

## 5.23 dimensionless\_grain\_size

dimensionless grain size

## 5.24 dynamic\_shear\_stress

dynamic shear stress

## 5.25 fractional\_transport\_engelund\_hansen

fractional sediment transport according to engelund and hansen

## 5.26 grain\_roughness\_rijn

grain roughness (skin friction) according to van Rijn

## 5.27 hiding\_exposure\_wu

## 5.28 manning\_to\_chezy

manning to chezy conversion

## 5.29 reference\_concentration\_smith\_lean

reference concentration according to smith and mclean

## 5.30 saltation\_layer\_thickness

## 5.31 sediment\_transport\_directed

directed sediment transport

## 5.32 sediment\_transport\_engelund\_hansen\_2

sediment transport according to engelund and hansen

## 5.33 sediment\_transport\_waves

sediment transport by waves

## 5.34 settling\_velocity

Settling velocity  
5.23d in julien-2010

## 5.35 settling\_velocity\_cheng

settling velocity according to cheng

### 5.36 settling\_velocity\_gravel

settling velocity in water

### 5.37 settling\_velocity\_stokes

stokes settling velocity  
d : [mm] diameter of sediment particle  
ws : [m/s] settling velocity  
      signed ws < 0 : falling  
(Note: was R, radius in m)  
  
valid for small particles

### 5.38 settling\_velocity\_to\_diameter

invert settling velocity to diameter

### 5.39 shields\_number

normalized shear stress, shear stress ratio

### 5.40 skin\_2\_total\_friction\_eh

skin friction to total friction conversion according to engelund  
and hansen

### 5.41 suspended\_grain\_size

suspended grain size distribution based on bed material grain size  
distribution

assumes that probability of suspension is inverse proportional to  
grain diameter  
as in Engelund-Hansen transport relation  
- no hiding effects considered  
- no threshold for large grains applied  
- no flocking considered

note: actual distribution varies with the depth

d : [1xnd] grain size in arbitrary units (on linear, not on log scale)  
h\_bed : [nsxnd] fractions of sediment of size d

## 5.42 suspended\_grain\_size\_non\_linear

suspended grain size distribution based on bed material grain size distribution

assumes that probability of suspension is inverse proportional to grain diameter

as in Engelund-Hansen transport relation

- no hiding effects considered
- no threshold for large grains applied
- no flocking considered

note: actual distribution varies with the depth

d : [1xnd] grain size in arbitrary units (on linear, not on log scale)  
h\_bed : [nsxnd] fractions of sediment of size d

## 5.43 suspended\_grain\_size\_rijn

grain size of the suspended sediment according to van rijn, empirical

## 5.44 suspended\_transport\_mclean

## 5.45 suspended\_transport\_rijn

suspended load transport according to van Rijn

## 5.46 suspended\_transport\_wu

suspended sediment transport according to Wu

## 6 t/test

### 6.1 test\_adaptation\_length\_bed

### 6.2 test\_critical\_shear\_stress

### 6.3 test\_settling\_velocity\_to\_diameter

## 7 t

### 7.1 total\_roughness\_engelund\_fredsoe

roughness lenght according to engelund and fredsoe

### 7.2 total\_roughness\_rijn

total roughness according to van rijn

### 7.3 total\_transport\_bagnold

total sediment transport accoding to bagnold

### 7.4 total\_transport\_eh\_distribution

total sediment transport according to engelund hansen  
for a given graqn size distribution

### 7.5 total\_transport\_engelund\_hansen

total sediment transport according to Engelund and Hansen

## **7.6 total\_transport\_rijn**

total sediment transport according to van rijn

## **7.7 transport\_stage\_mclean**

transport stage according to McLean

## **7.8 transport\_stage\_rijn**

transport stage as defined by van Rijn

## **7.9 vertical\_ssc\_profile\_mclean**

vertical profile of the suspended sediment according to McLean