

Manual for Package: sediment-transport

Revision 1:3M

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1 @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 @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 @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 @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 sediment-transport

analysis and prediction of fluvial sediment transport and morphodynamics

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 sediment_transport_directed

directed sediment transport

5.31 sediment_transport_engelund_hansen_2

sediment transport according to engelund and hansen

5.32 sediment_transport_waves

sediment transport by waves

5.33 settling_velocity

Settling velocity
5.23d in julien-2010

5.34 settling_velocity_cheng

settling velocity according to cheng

5.35 settling_velocity_gravel

settling velocity in water

5.36 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

5.37 settling_velocity_to_diameter

invert settling velocity to diameter

5.38 shields_number

normalized shear stress, shear stress ratio

5.39 skin_2_total_friction_eh

skin friction to total friction conversion according to engelund
and hansen

5.40 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

5.41 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

5.42 suspended_grain_size_rijn

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

5.43 suspended_transport_mclean

5.44 suspended_transport_rijn

suspended load transport according to van Rijn

5.45 suspended_transport_wu

suspended sediment transport according to Wu

6 test

6.1 test_adaptation_length_bed

6.2 test_critical_shear_stress

6.3 test_settling_velocity_to_diameter

7 sediment-transport

analysis and prediction of fluvial sediment transport and
morphodynamics

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