

Manual for Package: sediment-transport

Revision 1:7M

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Contents

| | | |
|----------|---------------------------------|----------|
| 1 | @GrainSizeDistribution | 1 |
| 1.1 | GrainSizeDistribution | 1 |
| 1.2 | assign_channel | 1 |
| 1.3 | bimodality | 1 |
| 1.4 | export_csv | 1 |
| 1.5 | export_shp | 1 |
| 1.6 | group_channels | 1 |
| 1.7 | group_curvature | 2 |
| 1.8 | group_histograms | 2 |
| 1.9 | load_coordinates | 2 |
| 2 | @Hermite_profile | 2 |
| 2.1 | Hermite_profile | 2 |
| 2.2 | fit | 2 |
| 2.3 | predict | 2 |
| 2.4 | regmtx | 2 |
| 2.5 | transform | 2 |
| 3 | @Nodal_Point | 3 |
| 3.1 | Adot | 3 |
| 3.2 | Nodal_Point | 3 |
| 3.3 | Qs_in | 3 |
| 3.4 | Qs_out | 3 |
| 3.5 | derive_jacobian | 3 |
| 3.6 | discharge | 3 |
| 3.7 | geometry | 3 |
| 3.8 | jacobian | 4 |
| 3.9 | phase_diagram | 4 |
| 3.10 | phase_diagram_wang | 4 |

| | | |
|----------|--|----------|
| 3.11 | solve | 4 |
| 3.12 | stability_analysis | 4 |
| 4 | @Parabolic_Constant_Profile | 4 |
| 4.1 | Parabolic_Constant_Profile | 4 |
| 4.2 | fit | 4 |
| 4.3 | predict | 4 |
| 4.4 | regmtx | 5 |
| 4.5 | transform | 5 |
| 5 | @Rouse_Profile | 5 |
| 5.1 | Rouse_Profile | 5 |
| 5.2 | fit | 5 |
| 5.3 | mean_concentration | 5 |
| 5.4 | predict | 5 |
| 5.5 | regmtx | 5 |
| 5.6 | rouse_number | 5 |
| 5.7 | rouse_number_to_grain_diameter | 6 |
| 5.8 | set_parameters | 6 |
| 5.9 | transform | 6 |
| 6 | sediment-transport | 6 |
| 6.1 | Exponential_SSC_Profile | 6 |
| 6.2 | adaptation_length_armanini | 6 |
| 6.3 | adaptation_length_bed | 6 |
| 6.4 | adaptation_length_flow | 6 |
| 6.5 | angle_of_repose | 6 |
| 6.6 | bar_mode_crosato | 7 |
| 6.7 | bed_layer_thickness | 7 |
| 6.8 | bed_load_einstein | 7 |
| 6.9 | bed_load_engelund_fredsoe | 7 |
| 6.10 | bed_load_transport_mpm | 7 |
| 6.11 | bed_load_transport_rijn | 7 |
| 6.12 | bed_load_transport_wu | 7 |
| 6.13 | bedform_dimension_rijn | 8 |
| 6.14 | bedform_roughness_rijn | 8 |
| 6.15 | bedform_roughness_rijn_2007 | 8 |
| 6.16 | bedload_direction | 8 |
| 6.17 | bedload_layer_thickness_mclean | 8 |
| 6.18 | bedload_transport_ashida_michue_1972 | 8 |
| 6.19 | bedload_transport_bagnold_1941 | 8 |
| 6.20 | bedload_transport_bagnold_1973 | 8 |
| 6.21 | bedload_transport_egashira | 8 |
| 6.22 | bifurcation_critical_aspect_ratio | 9 |

| | | |
|------|--|----|
| 6.23 | chezy_einstein | 9 |
| 6.24 | chezy_roughness_engelund_fredsoe | 9 |
| 6.25 | critical_grain_size | 9 |
| 6.26 | critical_shear_stress | 9 |
| 6.27 | critical_shear_stress_ratio | 9 |
| 6.28 | critical_shear_stress_wiberg | 9 |
| 6.29 | critical_shear_stress_wu | 9 |
| 6.30 | critical_shear_velocity | 10 |
| 6.31 | derive_combined_transport | 10 |
| 6.32 | derive_critical_grain_size | 10 |
| 6.33 | derive_mpm_foramtive_discharge | 10 |
| 6.34 | derive_suspended_sediment_concentration_profile | 10 |
| 6.35 | derive_suspended_sediment_concentration_profiles | 10 |
| 6.36 | dimensionless_grain_size | 10 |
| 6.37 | dune_celerity | 10 |
| 6.38 | dune_dimension_allen_1978 | 10 |
| 6.39 | dune_dimension_bradley_venditti | 11 |
| 6.40 | dune_dimension_gill | 11 |
| 6.41 | dune_dimension_julien_klaasen_1978 | 11 |
| 6.42 | dune_dimension_yalin | 11 |
| 6.43 | dune_height_karim | 11 |
| 6.44 | dynamic_shear_stress | 11 |
| 6.45 | formative_discharge | 11 |
| 6.46 | fractional_transport_engelund_hansen | 11 |
| 6.47 | grain_roughness_mpm | 11 |
| 6.48 | grain_roughness_nikuradse | 12 |
| 6.49 | grain_roughness_rijn | 12 |
| 6.50 | grain_roughness_wu | 12 |
| 6.51 | grain_size_from_shear_stress | 12 |
| 6.52 | hiding_exposure_wu | 12 |
| 6.53 | hydraulic_radius | 12 |
| 6.54 | integration_factor_wright_parker | 12 |
| 6.55 | matching_level_mclean | 12 |
| 6.56 | mobility_parameter_rijn | 12 |
| 6.57 | mpm2diameter | 12 |
| 6.58 | mpm_solve_for_dm | 13 |
| 6.59 | nikuradse_roughness_length | 13 |
| 6.60 | reference_concentration_einstein | 13 |
| 6.61 | reference_concentration_mclean | 13 |
| 6.62 | reference_concentration_mclean_2 | 13 |
| 6.63 | reference_concentration_rijn | 13 |
| 6.64 | reference_concentration_wright_parker | 13 |
| 6.65 | reference_concentration_zyserman_fredsoe | 13 |
| 6.66 | reference_height_rijn | 13 |

| | | |
|----------|---|-----------|
| 6.67 | reference_level_mclean | 13 |
| 6.68 | reference_to_flux_averaged_concentration_rijn | 14 |
| 6.69 | roughness_height_mclean | 14 |
| 6.70 | roughness_height_mclean_1972 | 14 |
| 6.71 | saltation_layer_thickness | 14 |
| 6.72 | sediment_load_ART_syvitski_2003 | 14 |
| 6.73 | sediment_load_ART_syvitski_2003b | 14 |
| 6.74 | sediment_transport_directed | 14 |
| 6.75 | sediment_transport_relation_fit | 14 |
| 6.76 | sediment_transport_relation_predict | 14 |
| 6.77 | sediment_transport_scale | 14 |
| 6.78 | sediment_transport_waves | 15 |
| 6.79 | settling_time_constant_eddy_viscosity | 15 |
| 6.80 | settling_velocity | 15 |
| 6.81 | settling_velocity_to_diameter | 15 |
| 6.82 | shear2shields | 15 |
| 6.83 | shear_velocity_mclean | 15 |
| 6.84 | shields_number | 15 |
| 6.85 | skin2total_stress_ratio | 16 |
| 6.86 | skin_2_total_friction_eh | 16 |
| 6.87 | stratification_parameter_rijn | 16 |
| 6.88 | stratification_parameter_wright_parker | 16 |
| 6.89 | stratification_profile_mclean | 16 |
| 6.90 | suspended_grain_size | 16 |
| 6.91 | suspended_grain_size_non_linear | 17 |
| 6.92 | suspended_grain_size_rijn | 17 |
| 6.93 | suspended_sediment_adaptation_length_claudin | 17 |
| 6.94 | suspended_transport_mclean | 17 |
| 6.95 | suspended_transport_rijn | 17 |
| 6.96 | suspended_transport_van_rijn_simplified_1984 | 17 |
| 6.97 | suspended_transport_wright_parker | 18 |
| 6.98 | suspended_transport_wu | 18 |
| 6.99 | suspension_parameter | 18 |
| 7 | test | 18 |
| 7.1 | test_Rouse_profile_fit | 18 |
| 7.2 | test_adaptation_length_bed | 18 |
| 7.3 | test_bed_load_transport_rijn | 18 |
| 7.4 | test_bedform_roughness_rijn_2007 | 18 |
| 7.5 | test_bedload_transport_mpm | 18 |
| 7.6 | test_critical_shear_stress | 18 |
| 7.7 | test_sediment_transport | 19 |
| 7.8 | test_sediment_transport_engelund_hansen_1 | 19 |
| 7.9 | test_sediment_transport_engelund_hansen_2 | 19 |

| | | |
|----------|--|-----------|
| 7.10 | test_sediment_transport_karim | 19 |
| 7.11 | test_sediment_transport_rijn | 19 |
| 7.12 | test_settling_velocity_to_diameter | 19 |
| 8 | sediment-transport | 19 |
| 8.1 | test_sediment_transport_relation | 19 |
| 8.2 | test_suspended_transport_mclean | 19 |
| 8.3 | test_suspended_transport_wright_parker | 19 |
| 8.4 | test_total_transport_engelund_hansen | 20 |
| 8.5 | test_total_transport_yang | 20 |
| 8.6 | total2skin_stress_ratio | 20 |
| 8.7 | total_2_skin_friction | 20 |
| 8.8 | total_roughness_engelund_fredsoe | 20 |
| 8.9 | total_roughness_engelund_fredsoe2 | 20 |
| 8.10 | total_roughness_karim | 20 |
| 8.11 | total_roughness_karim2 | 20 |
| 8.12 | total_roughness_length_mclean | 20 |
| 8.13 | total_roughness_parker | 20 |
| 8.14 | total_roughness_rijn | 21 |
| 8.15 | total_roughness_yalin | 21 |
| 8.16 | total_to_skin_stress_kishi | 21 |
| 8.17 | total_transport_ackers_white | 21 |
| 8.18 | total_transport_bagnold | 21 |
| 8.19 | total_transport_eh_distribution | 21 |
| 8.20 | total_transport_engelund_hansen | 21 |
| 8.21 | total_transport_engelund_hansen_2 | 21 |
| 8.22 | total_transport_karim | 21 |
| 8.23 | total_transport_rijn | 22 |
| 8.24 | total_transport_wu | 22 |
| 8.25 | total_transport_yang | 22 |
| 8.26 | transport_stage_mclean | 22 |
| 8.27 | transport_stage_rijn | 22 |
| 8.28 | vertical_ssc_profile_exponential | 22 |
| 8.29 | vertical_ssc_profile_mclean | 22 |
| 8.30 | viscosity_correction_sediment | 22 |

1 @GrainSizeDistribution

1.1 GrainSizeDistribution

1.2 `assign_channel`

1.3 `bimodality`

1.4 `export_csv`

1.5 `export_shp`

1.6 `group_channels`

1.7 `group_curvature`

1.8 `group_histograms`

1.9 `load_coordinates`

2 `@Hermite_profile`

2.1 `Hermite_profile`

suspended sedimen profile in form of a hermite polynomial

2.2 fit

fit suspended sediment profile

2.3 predict

predict suspended sediment concentration

2.4 regmtx

regression matrix

2.5 transform

hermite profile

3 @Nodal_Point

3.1 Adot

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

3.2 Nodal_Point

Nodal point relation for bifurcations, according to Wang

3.3 Qs_in

sediment entering branches

3.4 Qs_out

sediment leaving branches

3.5 derive_jacobian

derive Jacobian of the nodal point relation

3.6 discharge

discharge through branches
there is a problem with this relation, as soon as the bed of one
channel is perturbed,
the water level at the bifurcation changes, so the depth of the
second channel is not
entirely independent

3.7 geometry

cross section geometry of branches

3.8 jacobian

jacobian of the nodal point relation
semi-autogenerated

3.9 phase_diagram

phase diagram

3.10 phase_diagram_wang

phase diagram of Nodal point relation

3.11 solve

solve the nodal point relation for critical points

3.12 stability_analysis

stability analysis for a given configuration

4 @Parabolic_Constant_Profile

4.1 Parabolic_Constant_Profile

parabolic-constant profile

4.2 fit

fit the suspended sediment concentration profile

4.3 predict

predict suspended sediment concentration

4.4 regmtx

regression matrix

4.5 transform

transformation of vertical coordinate

5 @Rouse_Profile

5.1 Rouse_Profile

suspended sediment concentration profile

5.2 fit

fit the suspended sediment concentration profile

5.3 mean_concentration

5.4 predict

predict the suspended sediment concentration

5.5 regmtx

regression matrix

5.6 rouse_number

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

5.7 rouse_number_to_grain_diameter

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

5.8 set_parameters

5.9 transform

transform the vertical coordinate

6 sediment-transport

analysis and prediction of fluvial sediment transport and
morphodynamics

6.1 Exponential_SSC_Profile

6.2 adaptation_length_armanini

6.3 adaptation_length_bed

adaptatoion lenght of bed morphology

6.4 adaptation_length_flow

adaption length of the flow

6.5 angle_of_repose

6.6 bar_mode_crosato

bar mode of a river according to crosato

6.7 bed_layer_thickness

6.8 bed_load_einstein

bed load transport according to einstein jr.

6.9 bed_load_engelund_fredsoe

bed load transport according to engelund and fredsoe

6.10 bed_load_transport_mpm

bed load transport rate according to meyer-peter-mueller

6.11 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

6.12 bed_load_transport_wu

bed load transport according to Wu

6.13 bedform_dimension_rijn

bed form dimensions
cf. rijn 1984 iii

6.14 bedform_roughness_rijn

form drag according to van Rijn

6.15 bedform_roughness_rijn_2007

6.16 bedload_direction

bedload transport direction

6.17 bedload_layer_thickness_mclean

6.18 bedload_transport_ashida_michue_1972

6.19 bedload_transport_bagnold_1941

6.20 bedload_transport_bagnold_1973

6.21 bedload_transport_egashira

6.22 bifurcation_critical_aspect_ratio

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

6.23 chezy_einstein

chezy coefficient according to Einstein

6.24 chezy_roughness_engelund_fredsoe

chezy roughness according to engelund and fredsoe

6.25 critical_grain_size

critical grain size for a given shear velocity

6.26 critical_shear_stress

critical shear Stress

6.27 critical_shear_stress_ratio

critical shields parameter
aka critical shear stress ratio
aka shields curve

6.28 critical_shear_stress_wiberg

6.29 critical_shear_stress_wu

critical shear stress, according to wu

6.30 critical_shear_velocity

critical shear velocity

6.31 derive_combined_transport

6.32 derive_critical_grain_size

6.33 `derive_mpm_foramtive_discharge`

6.34 `derive_suspended_sediment_concentration_profile`

6.35 `derive_suspended_sediment_concentration_profiles`

6.36 `dimensionless_grain_size`

`dimensionless grain size`

6.37 `dune_celerity`

6.38 `dune_dimension_allen_1978`

6.39 `dune_dimension_bradley_venditti`

6.40 `dune_dimension_gill`

6.41 `dune_dimension_julien_klaasen_1978`

6.42 `dune_dimension_yalin`

6.43 dune_height_karim

6.44 dynamic_shear_stress

dynamic shear stress

6.45 formative_discharge

6.46 fractional_transport_engelund_hansen

fractional sediment transport according to engelund and hansen

6.47 grain_roughness_mpm

6.48 grain_roughness_nikuradse

6.49 grain_roughness_rijn

grain roughness (skin friction) according to van Rijn

6.50 grain_roughness_wu

6.51 grain_size_from_shear_stress

- 6.52 `hiding_exposure_wu`
- 6.53 `hydraulic_radius`
- 6.54 `integration_factor_wright_parker`
- 6.55 `matching_level_mclean`
- 6.56 `mobility_parameter_rijn`
- 6.57 `mpm2diameter`
- 6.58 `mpm_solve_for_dm`
- 6.59 `nikuradse_roughness_length`
- 6.60 `reference_concentration_einstein`
- 6.61 `reference_concentration_mclean`

6.62 `reference_concentration_mclean_2`

reference concentration according to smith and mclean

6.63 `reference_concentration_rijn`

6.64 `reference_concentration_wright_parker`

6.65 `reference_concentration_zyserman_fredsoe`

6.66 `reference_height_rijn`

6.67 `reference_level_mclean`

6.68 `reference_to_flux_averaged_concentration_rijn`

6.69 `roughness_height_mclean`

6.70 `roughness_height_mclean_1972`

6.71 `saltation_layer_thickness`

6.72 sediment_load_ART_syvitski_2003

6.73 sediment_load_ART_syvitski_2003b

6.74 sediment_transport_directed

directed sediment transport

6.75 sediment_transport_relation_fit

6.76 sediment_transport_relation_predict

6.77 sediment_transport_scale

6.78 sediment_transport_waves

sediment transport by waves

6.79 settling_time_constant_eddy_viscosity

6.80 settling_velocity

Settling velocity
5.23d in julien-2010
settling velocity according to cheng
settling velocity in water
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

6.81 settling_velocity_to_diameter

invert settling velocity to diameter

6.82 shear2shields

6.83 shear_velocity_mclean

6.84 shields_number

normalized shear stress, shear stress ratio

6.85 skin2total_stress_ratio

6.86 skin_2_total_friction_eh

skin friction to total friction conversion according to engelund
and hansen
function [theta,C] = skin_2_total_friction_eh(theta_t,Ct)

6.87 stratification_parameter_rijn

6.88 stratification_parameter_wright_parker

6.89 stratification_profile_mclean

6.90 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

6.91 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`

6.92 `suspended_grain_size_rijn`

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

6.93 `suspended_sediment_adaptation_length_claudin`

6.94 `suspended_transport_mclean`

vertical profile of the suspended sediment according to McLean
 $u := u_s / \kappa \log(z/z_0);$
 $I = 1 / (\int_a^h c \, dz \int_a^h u \, dz) \int_a^h c \, u \, dz$

6.95 `suspended_transport_rijn`

suspended load transport according to van Rijn

6.96 `suspended_transport_van_rijn_simplified_1984`

6.97 `suspended_transport_wright_parker`

6.98 `suspended_transport_wu`

suspended sediment transport according to widthu

6.99 suspension_parameter

7 test

7.1 test_Rouse_profile_fit

7.2 test_adaptation_length_bed

7.3 test_bed_load_transport_rijn

7.4 test_bedform_roughness_rijn_2007

7.5 test_bedload_transport_mpm

7.6 test_critical_shear_stress

7.7 test_sediment_transport

7.8 test_sediment_transport_engelund_hansen_1

7.9 test_sediment_transport_engelund_hansen_2

7.10 test_sediment_transport_karim

7.11 test_sediment_transport_rijn

7.12 test_settling_velocity_to_diameter

8 sediment-transport

analysis and prediction of fluvial sediment transport and
morphodynamics

8.1 test_sediment_transport_relation

8.2 test_suspended_transport_mclean

8.3 test_suspended_transport_wright_parker

8.4 test_total_transport_engelund_hansen

8.5 test_total_transport_yang

8.6 total2skin_stress_ratio

8.7 total_2_skin_friction

8.8 total_roughness_engelund_fredsoe

roughness lenght according to engelund and fredsoe

8.9 total_roughness_engelund_fredsoe2

8.10 total_roughness_karim

8.11 total_roughness_karim2

8.12 total_roughness_length_mclean

8.13 total_roughness_parker

8.14 total_roughness_rijn

total roughness according to van rijn

8.15 total_roughness_yalin

8.16 total_to_skin_stress_kishi

8.17 total_transport_ackers_white

8.18 total_transport_bagnold

total sediment transport according to bagnold

8.19 total_transport_eh_distribution

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

8.20 total_transport_engelund_hansen

total sediment transport according to Engelund and Hansen

8.21 total_transport_engelund_hansen_2

sediment transport according to engelund and hansen

8.22 total_transport_karim

8.23 total_transport_rijn

total sediment transport according to van rijn

8.24 total_transport_wu

total sediment transport according to wu 2000b

8.25 total_transport_yang

8.26 transport_stage_mclean

transport stage according to McLean

8.27 transport_stage_rijn

transport stage as defined by van Rijn

8.28 vertical_ssc_profile_exponential

8.29 vertical_ssc_profile_mclean

vertical profile of the suspended sediment according to McLean

8.30 viscosity_correction_sediment