

Manual for Package: ecohydrology

Revision 7M

Karl Kästner

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1 @Dodorico

1.1 Dodorico

1.2 derive_homogeneous_state

1.3 derive_poles

1.4 dz_dt

1.5 dz_dt_react

1.6 homogeneous_state

1.7 jacobian

1.8 poles

1.9 test_homogeneous_state

2 @Eutrophication

2.1 Eutrophication

2.2 dz_dt_react

2.3 homogeneous_states

2.4 jacobian

3 @Klausmeier

3.1 Klausmeier

3.2 dy_dx

$$(c - \nu) * D^3 * b + (\nu * c - c^2 - b^2 - 1) * D^2 * b + (c + c * b^2 - c * d + d * \nu) * D * b + (d * b^2 - r * b + d) * b$$

3.3 dy_dx_lin

3.4 dz_dt

c.f. Klausmeier 1999

3.5 dz_dt_react

3.6 homogeneous_state

4 @May1977

4.1 May1977

4.2 dz_dt_react

4.3 homogeneous_states

4.4 jacobian

5 @RAD_Model

5.1 RAD_Model

5.2 downsample

5.3 dz_dt

5.4 extract1

extract biomass, soil water and surface water from the combined
vector

5.5 extract2

5.6 filename

5.7 hash

has the model parameters for filename generation

5.8 init

5.9 init_advection_diffusion_matrix

5.10 init_fourier_matrices

5.11 load

5.12 make_symbolic

make model parameters symbolic

5.13 run

run the Rietkerk model with parameters specified by varargin,
or retrieve the saved results, when the model was already run

5.14 save

5.15 solve

5.16 `solve_euler_forward`

5.17 `solve_split`

6 `@Rietkerk`

6.1 `Rietkerk`

c.f. Rietkerk et al. 2002, Self-Organization of Vegetation in Arid
Ecosystems

6.2 `celerity`

migration celerity of the pattern

6.3 `continue_solve`

6.4 `critical_rainfall_depth`

6.5 `deflation_matrix`

6.6 `diffusion_rate`

6.7 dlogz_dx

Rietkerk pde transformed to set of odes through assuming wave-equations

6.8 downsample

6.9 downsample_z

6.10 dz_dt_coefficient

coefficients of the time-derivative of the Rietkerk-pde

6.11 dz_dt_coefficient_react_homogeneous

coefficients of the time-derivative of the Rietkerk-pde

6.12 dz_dt_coefficient_react_inhomogeneous

coefficients of the time-derivative of the Rietkerk-pde

6.13 dz_dt_react

time-derivative of the Rietkerk-pde
if (size(z,2)>1)

6.14 dz_dx

6.15 `growth_rate`

growth rate of biomass of the pattern

6.16 `homogeneous_state`

homogeneous (not necessarily stable) states of the Rietkerk system

6.17 `infiltration_enhancement`

infiltration enhancement of the Rietkerk model

6.18 `initial_condition_from_central_frequency`

extract dominant frequency from a previous model run and generate a
new
initial condition with only this frequency
for faster generation of asymptotic patterns

for 1D model setups

6.19 `initial_condition_periodic`

6.20 `jacobian`

jacobian of the Rietkerk model

6.21 `random_state`

generate random initial state

6.22 `reaction_matrix`

6.23 solve_stationary

solve until stationary state is reached

6.24 solve_trapezoidal

trapezoidal time stepping with fixed time step

6.25 stationary_step

quasi-stationary time-step

7 @Rietkerk_Map

7.1 Rietkerk_Map

database for Rietkerk model runs

7.2 init

7.3 write_table

write hashtable as human readable csv

8 derivation

8.1 klausmeier_derive_homogeneous_state

9 ecohydrology

9.1 migration_celerity_1d

estimate migration celerity of a travelling wave

9.2 mussel_dz_dt

10 test

10.1 test_dodorico

10.2 test_klausmeier

10.3 test_klausmeier_2d

10.4 test_rietkerk_asymptote

10.5 test_rietkerk_celerity

10.6 test_rietkerk_convergence

10.7 test_rietkerk_homogeneous

10.8 test_rietkerk_implicit_1d

10.9 test_rietkerk_implicit_2d

10.10 test_rietkerk_zero_inertia