Package 'PBSresilate'

July 13, 2009

Version 0.14

Date 2009-07-13

Title PBSresilate 0.14

Author Jon T. Schnute <Jon.Schnute@dfo-mpo.gc.ca>, Rowan Haigh <Rowan.Haigh@dfo-mpo.gc.ca>

Maintainer Jon Schnute <Jon.Schnute@dfo-mpo.gc.ca>

Depends R (>= 2.7.0), PBSmodelling, PBSddesolve, deSolve, rgl

Description This package uses an interactive GUI to control solvers, calculate states, and display results in 2D or 3D plots for published 3-state models (specifically their derivative formulae). The current name reflects resilience theory and emphasizes a close association with other PBS packages, particularly 'PBSmodelling'.

License GPL (>= 2)

R topics documented:

`resilate` *Resilate 3-State Models*

Description

Display resilations controlled by an interactive GUI.

Usage

```
resilate(model=NULL, hnam=NULL)
```

Arguments

`model`	string name of a 3-state model.
`hnam`	string name of a history file.

Details

The function `resilate()` creates an interactive GUI that can be used to display resilations of a 3-state model over time.

The GUI controls:

Model	
`Lorenz`	Use the Lorenz (1963) model for atmospheric currents.
`Hastings`	Use the Hastings & Powell (1991) model for linear food chains.
`Edwards`	Use the Edwards & Brindley (1999) model for plankton dynamics.
`Ludwig`	Use the Ludwig, Jones & Holling (1978) model for spruce buzzworm outbreak systems.
Solver	
`deSolve`	Use Petzold & Hindmarsh's `lsoda` function for ordinary differential equations.
`PBSddesolve`	Use Couture-Beil & Wood's `dde` function for delay-differential equations.
Parameters	
`Model`	Parameter models (control parameters are different for each model).
`Time`	Time parameters.
`start`	First time value.
`stop`	Last time value.
`step`	Time step at which to evaluate `y1, y2, y3`.
Initial State Values	
`y1,y2,y3`	Initial values for `y1`, `y2`, and `y3`.
Plot 2D or 3D?	
`2D`	Two-dimensional (flat) `pairs` plot.
`3D`	Three-dimensional plot using the `rgl` package function `plot3d`.
`X-Y plane`	On the 3D plot, superimpose the plot coordinates on the *x*-*y* plane (flatten *z*).
`Y-Z plane`	On the 3D plot, superimpose the plot coordinates on the *y*-*z* plane (flatten *x*).
`X-Z plane`	On the 3D plot, superimpose the plot coordinates on the *x*-*z* plane (flatten *y*).
`size2d`	Size of points in 2D-panels of 3D plot.
`size3d`	Size of points/spheres in 3D plot.
`Display points`	Type of points to plot: s = spheres, p = points, l = lines.
`hist`	Histogram bar colour.
`states`	Choose states to plot (`time`, `y1`, `y2`, `y3`, `dy1`, `dy2`, `dy3`). Note: choose only 3 states for a 3D plot.
`Calc`	Button to recalculate the state values and derivatives given the input parameters and time values.
`Plot`	Button to plot the chosen states in the specified dimension.
History	History widget.

References

Edwards, A.M. and Brindley, J. (1999) Zooplankton mortality and the dynamical behaviour of plankton population models. *Bulletin of Mathematical Biology* **61**, 303–339.

Hastings, A. and Powell, T. (1991) Chaos in a three-species food chain. *Ecology* **72(3)**, 896–903.

Lorenz, E.N. (1963) Deterministic non-periodic flows. *Journal of Atmospheric Science* **20**, 130–141. http://planetmath.org/encyclopedia/LorenzEquation.html

Ludwig, D., Jones, D.D. and Holling, C.S. (1978) Qualitative analysis of insect outbreak systems: the spruce budworm and forest. *The Journal of Animal Ecology* **47(1)**, 315–332.

`runResilate` *Start a Menu of Models for Resilation*

Description

Start a GUI that controls which models to pass into the `resilate` function.

Usage

```
runResilate()
```

Details

Looks at the names of R-code (`*.r`) in the folder '`.../PBSresilate/examples`' and uses the prefixes as available models.

Value

No value returned.

Author(s)

Rowan Haigh, Pacific Biological Station, Nanaimo BC

See Also

`resilate`

Index