Package ‘kinematics’

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Type Package
Title Studying Sampled Trajectories
Version 1.0.0
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Description Allows analyzing time series representing two-dimensional movements.
           It accepts a data frame with a time (t), horizontal (x) and vertical (y) coordinate as columns,
           and returns several dynamical properties such as speed, acceleration or curvature.
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Encoding UTF-8
LazyData true
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VignetteBuilder knitr
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Imports numDeriv, stats
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**accel**

*Return accelerations*

**Description**

Return accelerations

**Usage**

\[\text{accel}(t, x, y)\]

**Arguments**

- \(t\): The times vector
- \(x\): The x positions
- \(y\): The y positions

**Value**

The accelerations

**See Also**

*speed, approx_derivative*

---

**append_displacement**

*Return a dataframe with information about the time-to-time displacements*

**Description**

The displacement is a bit more complicated than other dynamical variables, as it depends on the sampling frequency. If you are subsampling, always re-run append_displacement after subsampling.

**Usage**

\[\text{append_displacement(data)}\]
**append_dynamics**

**Arguments**

- **data**  
  A dataframe containing t, x and y

**Value**

A data frame including all the dynamical information, including displacements

**See Also**

append_dynamics, speed

---

**Description**

Return a data frame with extra columns with dynamical information

**Usage**

```r
append_dynamics(data, append.displacement = TRUE)
```

**Arguments**

- **data**  
  A dataframe containing t, x and y
- **append.displacement**  
  (Optional) Set it to FALSE to not calculate displacements. Useful if the data is going to be resampled

**Value**

A data frame including instantaneous dynamical variables, such as speed and acceleration

**See Also**

speed, accel, append_displacement
approx_derivative  

Description

Approximate derivative

Usage

approx_derivative(t, x)

Arguments

t  Vector of times
x  Vector of values

Value

A vector (of the same size of t) representing the numerical derivative

See Also

speed, accel

curvature  

Description

Return curvatures

Usage

curvature(t, x, y)

Arguments

t  The times vector
x  The x positions
y  The y positions

Value

The local curvature

See Also

speed, accel, curvature_radius
**curvature_radius**

*Return curvature radius*

---

**Description**

Return curvature radius

**Usage**

`curvature_radius(t, x, y)`

**Arguments**

<table>
<thead>
<tr>
<th>t</th>
<th>The times vector</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>The x positions</td>
</tr>
<tr>
<td>y</td>
<td>The y positions</td>
</tr>
</tbody>
</table>

**Value**

The local curvature radius

**See Also**

`speed, accel, curvature`

---

**displacement**

*Return displacements*

---

**Description**

Return displacements

**Usage**

`displacement(x, y)`

**Arguments**

<table>
<thead>
<tr>
<th>x</th>
<th>The x positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>The y positions</td>
</tr>
</tbody>
</table>

**Value**

The displacements between a position and its previous
**example_mov**  
*Example data set*

**Description**

Experimental sample of 3000 positions of a macroinvertebrate

**Format**

A data frame with 3000 observations of:

- x horizontal position
- y vertical position
- t time ...

**get_polar_coordinates**  
*Get polar coordinates*

**Description**

Get polar coordinates

**Usage**

```
get_polar_coordinates(x, y, origin = c(0, 0))
```

**Arguments**

- **x**: Vector of x coordinates
- **y**: Vector if y coordinates
- **origin**: (Default = c(0, 0)) Position of the origin of coordinates

**Value**

Data frame with radius (r) and angle vectors (th)
speed

---

**Return speeds**

**Description**

Return speeds

**Usage**

```plaintext
speed(t, x, y)
```

**Arguments**

- **t**  
  The times vector
- **x**  
  The x positions
- **y**  
  The y positions

**Value**

The speeds

**See Also**

`accel`, `approx_derivative`
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