

# 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

**RoxygenNote** 7.1.1

**VignetteBuilder** knitr

**Suggests** testthat, knitr, utils, markdown, rmarkdown, ggplot2

**Imports** numDeriv, stats

**Depends** R (>= 3.5.0)

**NeedsCompilation** no

**Repository** CRAN

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accel	<i>Return accelerations</i>
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### Description

Return accelerations

### Usage

```
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](#)

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append_displacement	<i>Return a dataframe with information about the time-to-time displacements</i>
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### 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

```
append_displacement(data)
```

**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](#)

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append\_dynamics                    *Return a data frame with extra columns with dynamical information*

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**Description**

Return a data frame with extra columns with dynamical information

**Usage**

```
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](#)

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`approx_derivative`      *Approximate derivative*

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**Description**

Approximate derivative

**Usage**

```
approx_derivative(t, x)
```

**Arguments**

<code>t</code>	Vector of times
<code>x</code>	Vector of values

**Value**

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

**See Also**

[speed](#), [accel](#)

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`curvature`      *Return curvatures*

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**Description**

Return curvatures

**Usage**

```
curvature(t, x, y)
```

**Arguments**

<code>t</code>	The times vector
<code>x</code>	The x positions
<code>y</code>	The y positions

**Value**

The local curvature

**See Also**

[speed](#), [accel](#), [curvature\\_radius](#)

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curvature\_radius      *Return curvature radius*

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**Description**

Return curvature radius

**Usage**

```
curvature_radius(t, x, y)
```

**Arguments**

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

**Value**

The local curvature radius

**See Also**

[speed](#), [accel](#), [curvature](#)

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displacement      *Return displacements*

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**Description**

Return displacements

**Usage**

```
displacement(x, y)
```

**Arguments**

x	The x positions
y	The y positions

**Value**

The displacements between a position and its previous

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example\_mov

*Example data set*

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### 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 ...

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get\_polar\_coordinates *Get polar coordinates*

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### Description

Get polar coordinates

### Usage

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

### Arguments

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

### Value

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

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speed	<i>Return speeds</i>
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**Description**

Return speeds

**Usage**

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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