# Package 'specklestar'

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**Version** 0.0.1.7

**Title** Reduction of Speckle Data from BTA 6-m Telescope

**Description** A set of functions for obtaining positional parameters and magnitude difference between components of binary and multiple stellar systems from series of speckle images.

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**URL** https://drastega.github.io/docs/specklestar_vignette.html

**BugReports** https://github.com/drastega/specklestar/issues

**Depends** R (>= 3.0.0)

**Imports** Rcpp

**Suggests** imager, tidyverse, rgl, fftw, mrbsizeR, knitr, rmarkdown

**License** GPL-2

**NeedsCompilation** yes

**SystemRequirements** fftw3 (>= 3.1.2)

**Encoding** UTF-8

**LazyData** true

**LinkingTo** Rcpp

**RoxygenNote** 6.0.1

**VignetteBuilder** knitr

**Repository** CRAN

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## R topics documented:

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`middle_frame` *Middle frame*

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## Description

Average image of the series of 512 x 512 px images

## Usage

```
middle_frame(filename, subtrahend, threshold = 50000L)
```

## Arguments

| | |
|---|---|
| `filename` | A string. |
| `subtrahend` | 512 x 512 matrix to subtract. |
| `threshold` | An integer (default 50000). |

## Value

The 512 x 512 matrix of middle speckle image.

## Examples

```
obj_filename <- system.file("extdata", "ads15182_550_2_frames.dat", package = "specklestar")
zero_matrix <- matrix(0, 512, 512)
mf <- middle_frame(obj_filename, subtrahend = zero_matrix)
```

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`specklestar` *specklestar: A package for reduction of speckle data.*

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## Description

The specklestar package provides functions for obtaining power spectrum and autocorrelation function from speckle data.

## speckle_acf *Autocorrelation function calculation*

### Description

Autocorrelation function of power spectrum

### Usage

```
speckle_acf(ps)
```

### Arguments

| | |
|---|---|
| ps | 513 x 1024 power spectrum double matrix. |

### Value

The 513 x 1024 double matrix of ACF.

### Examples

```
obj_filename <- system.file("extdata", "ads15182_550_2_frames.dat", package = "specklestar")
pow_spec_diff <- speckle_ps_diff(obj_filename)
acf <- speckle_acf(pow_spec_diff)
```

## speckle_frame *Get selected speckle frame Get specified speckle frame as matrix from file*

### Description

Get selected speckle frame Get specified speckle frame as matrix from file

### Usage

```
speckle_frame(data_file = file.choose(), frame = 1)
```

### Arguments

| | |
|---|---|
| data_file | a character string with the path name to a file. |
| frame | an integer. |

### Value

512 x 512 matrix with given frame.

## Examples

```
## Not run:
# On Unix-like operating systems only
# Read frame number 2 from file to matrix
obj_filename <- system.file("extdata", "ads15182_550_2_frames.dat", package = "specklestar")
frame2 <- speckle_frame(obj_filename, 2)

## End(Not run)
```

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`speckle_generator` *Speckle Generator*

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## Description

Generate model 512 x 512 x 2 (bytes) speckle image of binary star

## Usage

```
speckle_generator(rho, theta, dm, seeing, speckle_sigma, wind)
```

## Arguments

| | |
|---|---|
| `rho` | a separation (an arcsec). |
| `theta` | a positional angle. |
| `dm` | a magnitude difference. |
| `seeing` | a number. |
| `speckle_sigma` | a number. |
| `wind` | a wind speed. |

## Value

The vector of model speckle image.

## Examples

```
speckle_vector <- speckle_generator(rho = 0.5, theta = 70,
dm = 0.3, seeing = 20, speckle_sigma = 1, wind = 0)
speckle_matrix <- matrix(speckle_vector, nrow = 512, ncol = 512)
```

## speckle_ps *Power spectrum calculation*

### Description

Power spectrum of the series of 512 x 512 speckle images

### Usage

```
speckle_ps(filename, dark, flat, threshold = 50000L)
```

### Arguments

| | |
|---|---|
| filename | a character string with the path name to a file. |
| dark | 512 x 512 middle frame matrix. |
| flat | 512 x 512 middle flat field matrix. |
| threshold | an integer (default is 50000). |

### Value

The 513 x 1024 double matrix of power spectrum.

### Examples

```
obj_filename <- system.file("extdata", "ads15182_550_2_frames.dat", package = "specklestar")
midd_dark <- matrix(0, 512, 512)
midd_flat <- matrix(1, 512, 512)
pow_spec <- speckle_ps(obj_filename, dark = midd_dark, flat = midd_flat)
```

## speckle_ps_diff *Power spectrum calculation*

### Description

Power spectrum of the difference of neighboring frames in the series of speckle images

### Usage

```
speckle_ps_diff(filename, threshold = 50000L)
```

### Arguments

| | |
|---|---|
| filename | a character string with the path name to a file. |
| threshold | an integer (default is 50000). |

## Value

The 513 x 1024 double matrix of power spectrum.

## Examples

```
obj_filename <- system.file("extdata", "ads15182_550_2_frames.dat", package = "specklestar")
pow_spec_diff <- speckle_ps_diff(obj_filename)
```

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# speckle_stat *Statistics of speckles*

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## Description

Calculate statistics of speckles in the series of 512 x 512 speckle images and filter "bad" frames

## Usage

```
speckle_stat(filename, threshold = 50000L)
```

## Arguments

| | |
|---|---|
| filename | a character string with the path name to a file. |
| threshold | an integer (default is 50000). |

## Value

The list with 2 elements 'badFrames' and 'hist':
1 number of bad frames,
2 double vector of speckle statistics.

## Examples

```
obj_filename <- system.file("extdata", "ads15182_550_2_frames.dat", package = "specklestar")
spec_stat <- speckle_stat(obj_filename)
```

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