

# Package ‘ReliaGrowR’

January 20, 2025

**Title** Reliability Growth Analysis

**Version** 0.1.3

**Description** Modeling and plotting functions for Reliability Growth Analysis (RGA). Models include the Duane (1962) <[doi:10.1109/TA.1964.4319640](https://doi.org/10.1109/TA.1964.4319640)>, Non-Homogeneous Poisson Process (NHPP) by Crow (1975) <<https://apps.dtic.mil/sti/citations/ADA020296>>, Piecewise Weibull NHPP by Guo et al. (2010) <[doi:10.1109/RAMS.2010.5448029](https://doi.org/10.1109/RAMS.2010.5448029)>, and Piecewise Weibull NHPP with Change Point Detection based on the 'segmented' package by Muggeo (2024) <<https://cran.r-project.org/package=segmented>>.

**Imports** stats, graphics, segmented

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**Encoding** UTF-8

**RoxygenNote** 7.3.2

**Suggests** knitr, rmarkdown, spelling, testthat (>= 3.0.0)

**Language** en-US

**URL** <https://paulgovan.github.io/ReliaGrowR/>,  
<https://github.com/paulgovan/ReliaGrowR>

**Config/testthat/edition** 3

**VignetteBuilder** knitr

**BugReports** <https://github.com/paulgovan/ReliaGrowR/issues>

**NeedsCompilation** no

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duane_plot	<i>Plotting Function for Duane Analysis.</i>
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**Description**

Plotting Function for Duane Analysis.

**Usage**

```
duane_plot(  
  times,  
  failures,  
  plot = TRUE,  
  point_col = "black",  
  line_col = "black",  
  xlab = "Cumulative Time",  
  ylab = "Cumulative MTBF",  
  main = "Duane Plot with Cumulative MTBF"  
)
```

**Arguments**

times	A vector of cumulative times at which failures occurred.
failures	A vector of the number of failures at each corresponding time in times.
plot	Show Duane Plot (TRUE) or hide plot (FALSE).
point_col	Color for the data points (default: "black").
line_col	Color for the fitted line (default: "black").
xlab	Label for the x-axis (default: "Cumulative Time").
ylab	Label for the y-axis (default: "Cumulative MTBF").
main	Title for the plot (default: "Duane Plot with Cumulative MTBF").

**Value**

The function returns a list of the fitted linear model, Cumulative Time, Cumulative MTBF.

**Examples**

```
library(ReliaGrowR)  
times <- c(100, 200, 300, 400, 500)  
failures <- c(1, 2, 1, 3, 2)  
fit <- duane_plot(times, failures)  
summary(fit)
```

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`plot_rga`*Plotting Function for Reliability Growth Analysis*

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**Description**

Plotting Function for Reliability Growth Analysis

**Usage**

```
plot_rga(  
  rga_obj,  
  point_col = "black",  
  line_col = "black",  
  xlab = "Cumulative Time",  
  ylab = "Cumulative Failures",  
  main = "Reliability Growth Analysis"  
)
```

**Arguments**

<code>rga_obj</code>	An object of class <code>rga</code> , which contains the results from the RGA model.
<code>point_col</code>	Color for the data points (default: "black").
<code>line_col</code>	Color for the fitted line (default: "black").
<code>xlab</code>	Label for the x-axis (default: "Cumulative Time").
<code>ylab</code>	Label for the y-axis (default: "Cumulative Failures").
<code>main</code>	Title for the plot (default: "Reliability Growth Analysis").

**Value**

The function does not return a value.

**Examples**

```
times <- c(100, 200, 300, 400, 500)  
failures <- c(1, 2, 1, 3, 2)  
result <- rga(times, failures)  
plot_rga(result)
```

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rga

*Reliability Growth Analysis.*

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## Description

Reliability Growth Analysis.

## Usage

```
rga(  
  times,  
  failures,  
  model_type = "Crow-AMSAA",  
  breakpoints = NULL,  
  conf_level = 0.95  
)
```

## Arguments

times	A vector of cumulative times at which failures occurred.
failures	A vector of the number of failures at each corresponding time in times.
model_type	The model type. Either Crow-AMSAA (default) or Piecewise Weibull NHPP with change point detection.
breakpoints	An optional vector of breakpoints for the Piecewise Weibull NHPP model.
conf_level	The desired confidence level, which defaults to 95%.

## Value

The function returns an object of class `rga` that contains the results for the model.

## Examples

```
times <- c(100, 200, 300, 400, 500)  
failures <- c(1, 2, 1, 3, 2)  
result <- rga(times, failures)  
print(result)
```

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weibull_to_rga	<i>Convert Weibull Data to Reliability Growth Data</i>
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**Description**

Convert Weibull Data to Reliability Growth Data

**Usage**

```
weibull_to_rga(failures, suspensions = NULL)
```

**Arguments**

failures        A vector of failure times.  
suspensions    A vector of suspension (censoring) times.

**Value**

A data frame with times and failure counts suitable for reliability growth analysis.

**Examples**

```
failures <- c(100, 200, 200, 400)  
suspensions <- c(250, 350, 450)  
result <- weibull_to_rga(failures, suspensions)  
print(result)
```

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