

Package ‘funresMech’

October 6, 2026

Title Mechanistic Functional Response Analysis

Version 1.1.0

Description Implements the mechanistic functional response model proposed by Okuyama (2012) <[doi:10.1016/j.biocontrol.2011.10.008](https://doi.org/10.1016/j.biocontrol.2011.10.008)> for host-parasitoid systems. Provides tools for model fitting, likelihood profiling, stochastic simulation, and visualization of parasitism distributions.
The stochastic simulation engine is implemented in C++ via 'Rcpp'. Includes an interactive 'shiny' application for complete analysis workflows, built with 'plotly' for interactive graphics and 'rmarkdown' for reproducible reports.

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Encoding UTF-8

Depends R (>= 4.1.0)

Imports DEoptim, dplyr, future, ggplot2 (>= 3.4.0), magrittr, parallel, plotly, Rcpp, rlang, rmarkdown, shiny, shinyBS, shinythemes, stats, utils

LinkingTo Rcpp

Suggests kableExtra, knitr, testthat (>= 3.0.0)

URL <https://github.com/Segon03/funresMech>

BugReports <https://github.com/Segon03/funresMech/issues>

Config/testthat/edition 3

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NeedsCompilation yes

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Repository CRAN

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funresMech-package	<i>funresMech: Mechanistic Functional Response Analysis</i>
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Description

Implements the mechanistic, stochastic functional response model of Okuyama (2012, 2026) for host-parasitoid systems. The probability distribution of the number of parasitised hosts is obtained by simulating the search-encounter-handling process (Gamma search times, Lognormal handling times), and the parameters are estimated by maximum likelihood with a simulated likelihood. The simulation engine is written in C++ with 'Rcpp'.

Details

The package is used through the interactive application started with [run_app\(\)](#), which fits the model, computes the likelihood profile of the density-scaling exponent z (95% interval by the likelihood-ratio criterion), compares the model with free z against $z = 1$ by AIC, reports diagnostics and screens atypical trials.

Author(s)

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References

- Okuyama, T. (2012). A likelihood approach for functional response models. *Biological Control*, 60(2), 103-107. doi:10.1016/j.biocontrol.2011.10.008
- Okuyama, T. (2026). Parametric assumptions in parasitoid functional response analysis. *Journal of Applied Entomology*. doi:10.1111/jen.70148

See Also

[run_app\(\)](#)

run_app*Run the funresMech Shiny App*

Description

Launches the interactive application for mechanistic functional response analysis, based on the Okuyama model.

Usage

```
run_app(...)
```

Arguments

... Additional arguments passed to `shiny::runApp()` (e.g., `port`, `host`, `launch.browser`).

Details

The application fits the model to a table with one row per trial (species, host density and number of parasitised hosts) and offers the following tabs: fitted parameters, likelihood profile of the density-scaling exponent z with its 95% interval, stochastic curves and distributions, diagnostics (small k , parameters on a bound, open intervals), screening of atypical trials, and an HTML report. The parameter s is the standard deviation of the handling time on the natural scale (same units as h).

The profile is computed in parallel with the 'future' package, so results are reproducible with `set.seed()` before launching the app.

Value

This function launches a Shiny app and does not return a value.

References

Okuyama, T. (2012). A likelihood approach for functional response models. *Biological Control*, 60(2), 103-107. doi:10.1016/j.biocontrol.2011.10.008

Okuyama, T. (2026). Parametric assumptions in parasitoid functional response analysis. *Journal of Applied Entomology*. doi:10.1111/jen.70148

Examples

```
if (interactive()) {  
  run_app()  
}
```

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