

# Package ‘lsoda’

April 22, 2025

**Type** Package

**Title** 'C++' Header Library for Ordinary Differential Equations

**Version** 1.0

**Description** A 'C++' header library for using the 'libsoda-cxx' library with R. The 'C++' header reimplements the 'lsoda' function from the 'ODEPACK' library for solving initial value problems for first order ordinary differential equations (Hindmarsh, 1982; <[https://computing.llnl.gov/sites/default/files/ODEPACK\\_pub1\\_u88007.pdf](https://computing.llnl.gov/sites/default/files/ODEPACK_pub1_u88007.pdf)>). The 'C++' header can be used by other R packages by linking against this package. The 'C++' functions can be called inline using 'Rcpp'. Finally, the package provides an 'ode' function to call from R.

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**URL** <https://github.com/mclements/lsoda>

**BugReports** <https://github.com/mclements/lsoda/issues>

**Imports** Rcpp (>= 1.0.12)

**Suggests** deSolve, RcppArmadillo, RcppEigen, microbenchmark

**LinkingTo** Rcpp

**RoxygenNote** 7.3.2

**Encoding** UTF-8

**NeedsCompilation** yes

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**Repository** CRAN

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Description

Ordinary differential equation solver using lsoda

Usage

```
ode(y, times, func, rtol = 1e-06, atol = 1e-06)
```

Arguments

- y                    vector of initial state values
- times                vector of times – including the start time
- func                 R function with signature function(t,y) that returns a list. The first list element is a vector for dy/dt. The second list elements, if it exists, is a vector of result calculations to be retained.
- rtol                  double for the relative tolerance
- atol                  double for the absolute tolerance

Value

a matrix for times in the first column and the state and results values in the other columns.

Examples

```
times = c(0,0.4*10^(0:10))
y = c(1,0,0)
func = function(t,y,...) {
  ydot = rep(0,3)
  ydot[1] = 1.0E4 * y[2] * y[3] - .04E0 * y[1]
  ydot[3] = 3.0E7 * y[2] * y[2]
  ydot[2] = -1.0 * (ydot[1] + ydot[3])
  list(ydot, sum(y))
}
lsoda::ode(y,times,func, rtol=1e-8, atol=1e-8)
```

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