GenSSI

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Contents

1 GenSSI 2.0 General Documentation

1.1 Introduction

GenSSI is a Matlab implementation of generating series for structural identifiability as defined in

- Chiş, O.-T., Banga, J.R. and Balsa-Canto, E. (2011) Structural Identifiability of Systems Biology Models: A Critical Comparison of Methods, PLoS ONE, 6, e27755.
- Chiş, O., Banga, J.R. and Balsa-Canto, E. (2011) GenSSI: a software toolbox for structural identifiability analysis of biological models, Bioinformatics, 27, 2610-2611.

With GenSSI, the user can specify differential equation models in terms of symbolic variables in Matlab and then analyze the models to determine which parameters are globally or locally identifiable. In addition, there are some utilities for converting models to polynomial form, or to or from AMICI format.

1.2 Availability

The sources for GenSSI are accessible as

- Source `tarball`
- Source `zipball`
- Git repository on `github`

Once you've obtained your copy check out the Installation

1.2.1 Obtaining GenSSI via the Git versioning system

In order to always stay up to date with the latest GenSSI versions, simply pull it from our Git repository and recompile it when a new release is available. For more information about Git checkout their `website`

The Git repository can currently be found at `https://github.com/thomassligon/GenSSI` and a direct clone is possible via

```
git clone https://github.com/thomassligon/GenSSI.git GenSSI
```

1.2.2 License Conditions

This software is available under the BSD license

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

1.3 Installation

If GenSSI was downloaded as a zip, it needs to be unpacked in a convenient directory. If GenSSI was obtained via cloning of the git repository, no further unpacking is necessary.

Models are generally stored in

```
GenSSI/Examples
```

but GenSSI should be able to find them in any directory that is is the Matlab path.

When a model is analyzed GenSSI stores the results in

```
GenSSI/Results
```

To use GenSSI, start Matlab and add the GenSSI direcory to the Matlab path. To add all toolbox directories to the Matlab path, execute the Matlab script

```
genssiStartup.m
```

To store the installation for further Matlab session, the path can be saved via

```
savepath
```

2 Model Definition & Simulation

In the following we will give a detailed overview how to specify models in GenSSI and how to call the code for analyzing the model. We use the Goodwin oscillator as an example.

2.1 Model Definition

This manual will guide the user to specify models in Matlab. For example implementations, see the models in the example directory.

2.1.1 Header

The model definition needs to be defined as a function which returns a struct with all symbolic definitions and options.

```
function [model] = Goodwin()
```

2.1.2 Name

Give the model a name.

```
model.Name = 'Goodwin';
```

2.1.3 Derivatives

Set the number of derivatives to be calculated.

```
model.Nder = 8;
```

2.1.4 States

Create the respective symbolic variables. The name of the symbolic variable can be chosen arbitrarily.

```
syms x1 x2 x3
```

Create the state vector containing all states:

```
model.X = [x1 x2 x3];
```

Define the number of states.

```
model.Neq = 3;
```

2.1.5 Parameters

Create the respective symbolic variables. The name of the symbolic variable can be chosen arbitrarily.

```
syms p1 p2 p3 p4 p5 p6 p7 p8
```

Create the parameters vector of parameters to be considered for identifiability.

```
model.Par = [p1 p2 p3 p4 p5 p6 p7 p8];
```

Specify the number of parameters to be considered for identifiability.

```
model.Npar = 8;
```

2.1.6 Equations

Define the equations of the model.

```
A1 = -p4*x1+p1/(p2+x3^p3);
A2 = p5*x1-p6*x2;
A3 = p7*x2-p8*x3;
model.F=[A1 A2 A3];
```

2.1.7 Controls

Define the controls.

```
g1=0;
g2=0;
g3=0;
model.G=[g1 g2 Ag3];
```

Define the number of controls.

```
model.Noc = 0;
```

Note that the length of the control vector should match the number of states, even if there are fewer controls.

2.1.8 Observables

Define the observables.

```
h1 = x1;
h2 = x2;
h3 = x3;
model.H = [h1 h2 h3];
```

Define the number of obserables.

```
model.Nobs = 1;
```

2.1.9 Initial Conditions

Define the initial conditions.

```
model.IC = [0.3 0.9 1.3];
```

2.2 Model Analysis

The model can then be analyzed by calling genssiMain. The first parameter is the name of the model, and the second parameter is the format. If the format is absent, the model is assumed to be a function, as described above. If it is equal to 'mat', the model is assumed to be a Matlab file with name Modelname.mat (e.g. Goodwin.mat) and containing the model struct.

```
genssiMain('Goodwin')
```

The function genssiMain will call the model function or load the .mat file, which puts the model struct in memory. After that, it will call all other GenSSI functions required to annalyze the model.

2.3 Conversion Utilities

The GenSSI package also includes some functions for converting models from one format to another.

`genssiToPolynomial`

genssiToPolynomial converts a model, expressed in terms of rational expressions, to pure polynomial format. This increases the number of state variables, but can sometimes significantly reduce the computational overhead for analyzing the model.

`genssiToAMICI`

genssiToAMICI converts a GenSSI model to AMICI format. The AMICI package uses Sundials Cvodes to efficiently solve ODEs from within Matlab. It is available at https://github.com/AMICI-developer/AMICI.

Note: There are limitations to this conversion. The GenSSI model contains a list of parameters to be considered for analysis, but AMICI needs a "sym" statement containing a list of all parameters used by the model. It may be necessary to manually edit the AMICI model after conversion.

`genssiFromAMICI`

genssiFromAMICI converts an AMICI model to GenSSI format.

Note: There are limitations to this conversion. The AMICI model contains a list of all parameters used by the model, but GenSSI needs a list of parameters to be considered for analysis. In addition, the GenSSI model created by the conversion contains default values for parameters such as the number of derivatives. It may be necessary to manually edit the GenSSI model after conversion.

`genssiStructToSource and amiciStructToSource`

genssiStructToSource reads the GenSSI model struct and converts it to source format (Matlab function definition), and amiciStructToSource does the same for AMICI models. In general, the source format is more convenient for smaller models, since it is easier to modify, but the struct format, typically saved in a Matlab file (e.g. Goodwin.mat) is more convenient for large models, since it does not require editing of long lines of code.

3 Code Organization

In the following we will briefly outline how the GenSSI code is organized. For a more detailed description we refer the reader to the documentation of the individual functions.

3.1 Directory Structure

The main, or root, directory, which we refer to as GenSSI, contains most of the GenSSI functions. In addition, the following subdirectories are used:

- GenSSI/Auxiliary contains some auxiliary functions, such as genssiRemoveZeroRows.
- GenSSI/Examples contains model definitions.
- GenSSI/Results contains the results of analysis.
- GenSSI/Docu contains tools for creating the GenSSI documentation, as well as input and output of that process.
- GenSSI/Docu/config contains configuration files for the documentation tools.
- GenSSI/Docu/input contains input for document creation, including .dox files.
- GenSSI/Docu/output contains

3.2 Document Creation

New versions of the documentation are created with the help of:

- MatlabDocMaker.m (in GenSSI/Docu)
- mtoc++ (needs to be installed and available via the path variable)
- Doxygen (needs to be installed and available via the path variable)
- LaTex (needs to be installed and available via the path variable)
- Graphviz (needs to be installed and available via the path variable)
- Gostscript (needs to be installed and available via the path variable)

The documentation configuration is changed by editing the files in the GenSSI/Docu/config directory and by running

```
MatlabDocMaker.setup
```

A new version of the documentation is created by calling

```
MatlabDocMaker.create('latex',true)
```

This results in an html version of the guide (index.html and many other files in GenSSI/Docu/output), and a pdf version (refman.pdf in GenSSI/Docu/output/latex).

4 File Documentation

4.1 genssiComputeLieDerivatives.m File Reference

genssiComputeLieDerivatives computes Lie derivatives of the output functions (model.H), the state vectors (model.X), and the initial conditions (model.IC) with respect to the equations (model.F) and controls (model.G)

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiComputeLieDerivatives (matlabtypesubstitute model, matlabtypesubstitute options)

  genssiComputeLieDerivatives computes Lie derivatives of the output functions (model.H), the state vectors (model.X), and the initial conditions (model.IC) with respect to the equations (model.F) and controls (model.G)

4.1.1 Function Documentation

4.1.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiComputeLieDerivatives (matlabtypesubstitute *model,* matlabtypesubstitute *options*)

Parameters

model	model definition (struct)
options	processing options (struct)

Return values

options	processing options (struct)
VectorLieDerivatives	a vector of all Lie derivatives

Definition at line 17 of file genssiComputeLieDerivatives.m.

Here is the call graph for this function:

Here is the caller graph for this function:

4.2 genssiComputeReducedTableau.m File Reference

genssiComputeReducedTableau computes reduced tableaus of the jacobian by eliminating rows and columns where solutions to relationships can found or excluded.

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiComputeReducedTableau (matlabtypesubstitute model, matlabtypesubstitute results, matlabtypesubstitute VectorLieDerivatives, matlabtypesubstitute JacParam, matlabtypesubstitute options)

  genssiComputeReducedTableau computes reduced tableaus of the jacobian by eliminating rows and columns where solutions to relationships can found or excluded.

4.2.1 Function Documentation

4.2.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiComputeReducedTableau (matlabtypesubstitute *model,* matlabtypesubstitute *results,* matlabtypesubstitute *VectorLieDerivatives,* matlabtypesubstitute *JacParam,* matlabtypesubstitute *options*)

Parameters

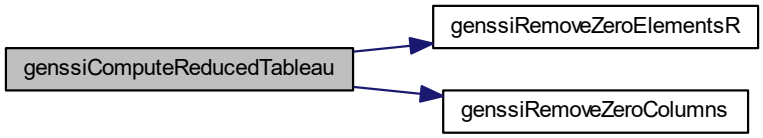
model	model definition (struct)
results	results of compute tableau (symbolic matrix)
VectorLieDerivatives	vector of Lie derivatives (symbolic array)
JacParam	jacobian with respect to parameters (symbolic matrix)
options	options (struct)

Return values

options	options (struct)
results	results of compute tableau (symbolic matrix)
RJacParam01	reduced tableau (binary matrix)
ECC	equations (symbolic matrix)
rParam	reduced list of parameters (symbolic array)

Definition at line 17 of file genssiComputeReducedTableau.m.

Here is the call graph for this function:



Here is the caller graph for this function:

4.3 genssiComputeTableau.m File Reference

genssiComputeTableau computes the tableau based on the jacobian of the Lie derivatives.

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiComputeTableau (matlabtypesubstitute model, matlabtypesubstitute VectorLieDerivatives, matlabtypesubstitute options)

  genssiComputeTableau computes the tableau based on the jacobian of the Lie derivatives.

4.3.1 Function Documentation

4.3.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiComputeTableau (matlabtypesubstitute *model,* matlabtypesubstitute *VectorLieDerivatives,* matlabtypesubstitute *options*)

Parameters

model	model definition (struct)
VectorLieDerivatives	vector of Lie derivatives (symbolic array)
options	options (struct)

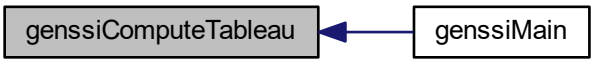
Return values

options	options (struct)
results	results of calculations (struct)
JacParam	jacobian of the Lie derivatives with respect to the parameters (symbolic matrix)

Definition at line 17 of file genssiComputeTableau.m.

Here is the call graph for this function:

Here is the caller graph for this function:



4.4 genssiFromAmici.m File Reference

GenSsiFromAmici converts an AMICI model to a GenSSI model and puts the results into the examples directory.

Functions

- mlhsInnerSubst< matlabtypesubstitute > genssiFromAmici (matlabtypesubstitute modelNameIn, matlabtypesubstitute modelNameOut)

  GenSsiFromAmici converts an AMICI model to a GenSSI model and puts the results into the examples directory.

4.4.1 Function Documentation

4.4.1.1 mlhsInnerSubst< matlabtypesubstitute > genssiFromAmici (matlabtypesubstitute *modelNameIn*, matlabtypesubstitute *modelNameOut*)

Parameters

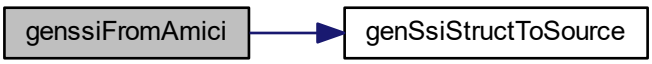
modelNameIn	name of the AMICI model (string)
modelNameOut	name of the GenSSI model (string)

Return values

modelNameOut	void

Definition at line 17 of file genssiFromAmici.m.

Here is the call graph for this function:



4.5 genssiJacobian2D.m File Reference

jacobian of 2D matrix, calculated as in MAPLE

Functions

- mlhsInnerSubst< matlabtypesubstitute > GenSsiJacobian2D (matlabtypesubstitute f, matlabtypesubstitute v)

  jacobian of 2D matrix, calculated as in MAPLE

4.6 genssiMain.m File Reference

genssiMain is the main function of GenSSI. It reads a model and calls all other functions necessary for analyzing the model.

Functions

- mlhsInnerSubst< matlabtypesubstitute > genssiMain (matlabtypesubstitute varargin)

  genssiMain is the main function of GenSSI. It reads a model and calls all other functions necessary for analyzing the model.

4.6.1 Function Documentation

4.6.1.1 mlhsInnerSubst< matlabtypesubstitute > genssiMain (matlabtypesubstitute *varargin*)

Parameters

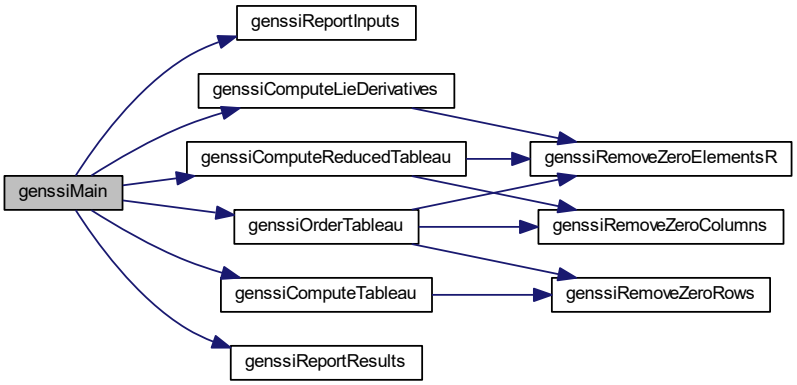
varargin	generic input arguments `1 genssiMain ( modelName, fileFormat, model, mat )` *Required Parameters for varargin:* • modelName the name of the model to be analyzed (a string) • fileFormat the format of the model file • model (default) if the model is a function file (e.g. Goodwinn.m) • mat if the model is a Matlab file (e.g. Goodwin.mat)

Return values

varargout	generic output arguments
options	struct containing options

Definition at line 17 of file genssiMain.m.

Here is the call graph for this function:



4.7 genssiOrderTableau.m File Reference

genssiOrderTableau orders tableaus, searches for new opportunities to eliminate rows or columns be solving equations, and creates new (reduced) tableaus.

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiOrderTableau (matlabtypesubstitute model, matlabtypesubstitute results, matlabtypesubstitute RJacParam01, matlabtypesubstitute ECC, matlabtypesubstitute rParam, matlabtypesubstitute options)

genssiOrderTableau orders tableaus, searches for new opportunities to eliminate rows or columns be solving equations, and creates new (reduced) tableaus.

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > mtoc_subst_genssiOrderTableau_m_ (matlabtypesubstitute Param, matlabtypesubstitute Param_local, matlabtypesubstitute global_ident_par, matlabtypesubstitute Mat_index, matlabtypesubstitute RJacparam_new, matlabtypesubstitute RJacParam01_nonzero_rows, matlabtypesubstitute sum_RJacParam01_nonzero_rows_t, matlabtypesubstitute ECC, matlabtypesubstitute ECC_new, matlabtypesubstitute options)

  displayRelevantParameters displays relevant parameters
- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > mtoc_subst_genssiOrderTableau_m_tsbus_cotm_displayReducedTableau (matlabtypesubstitute ECC_remaining, matlabtypesubstitute Param_local, matlabtypesubstitute Param_display, matlabtypesubstitute global_ident_par, matlabtypesubstitute display_tableau_RJacparam_new, matlabtypesubstitute number_fig, matlabtypesubstitute options)

  displayReducedTableau displays reduced tableaus
- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > mtoc_subst_genssiOrderTableau_m_tsbus_cotm_displayRemainingParameters (matlabtypesubstitute ECC_remaining, matlabtypesubstitute Param_local, matlabtypesubstitute Param_remaining, matlabtypesubstitute global_ident_par, matlabtypesubstitute display_tableau_RJacparam_new, matlabtypesubstitute row_index_1, matlabtypesubstitute tableau_for_second_reduced_tableau, matlabtypesubstitute parameters_for_second_reduced_tableau, matlabtypesubstitute number_fig, matlabtypesubstitute options)

  displayReducedTableau displays the remaining parameters
- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > mtoc_subst_genssiOrderTableau_m_tsbus_cotm_solveRemPar (matlabtypesubstitute ECC, matlabtypesubstitute Param, matlabtypesubstitute Param_local, matlabtypesubstitute global_ident_par)

  solveRemPar solves the remaining parameters
- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > mtoc_subst_genssiOrderTableau_m_tsbus_cotm_getIndexOfDuplicateParams (matlabtypesubstitute ECC, matlabtypesubstitute RJacParam01_nonzero_rows)

  getIndexOfDuplicateParams gets index of duplicate parameters

4.7.1 Function Documentation

4.7.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiOrderTableau (matlabtypesubstitute *model*, matlabtypesubstitute *results*, matlabtypesubstitute *RJacParam01*, matlabtypesubstitute *ECC*, matlabtypesubstitute *rParam*, matlabtypesubstitute *options*)

Parameters

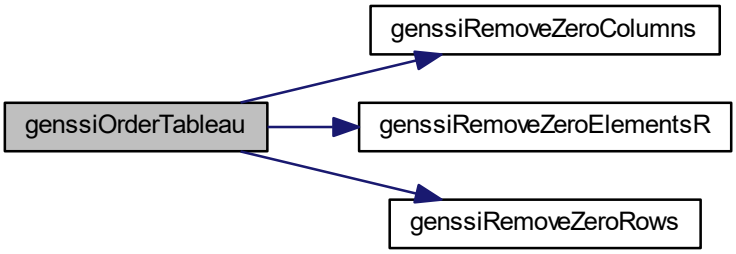
model	model definition (struct)
results	results of previous steps (struct)
RJacParam01	reduced tableau, i.e. binary form of jacobian of the Lie derivatives with respect to the parameters (binary matrix)
ECC	equations (symbolic array)
rParam	reduced list of parameters (symbolic array)
options	options (struct)

Return values

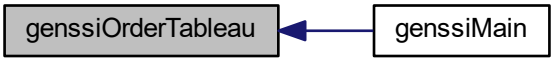
options	options (struct)
results	results of previous steps (struct)

Definition at line 17 of file genssiOrderTableau.m.

Here is the call graph for this function:



Here is the caller graph for this function:



4.8 genssiRemoveZeroColumns.m File Reference

genssiRemoveZeroColumns removes zero columns from a matrix

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroColumns (matlabtypesubstitute matrixIn)

  genssiRemoveZeroColumns removes zero columns from a matrix

4.8.1 Function Documentation

4.8.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroColumns (matlabtypesubstitute *matrixIn*)

Parameters

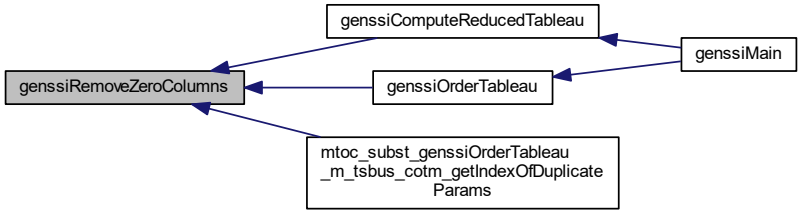
matrixIn	input (matrix)

Return values

matrixOut	output (matrix)
keepBoolean	boolean vector of indices kept (array)
keepIndex	vector of indices keept (array)

Definition at line 17 of file genssiRemoveZeroColumns.m.

Here is the caller graph for this function:



4.9 genssiRemoveZeroElementsC.m File Reference

genssiRemoveZeroElements removes zero columns from a row vecor

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroElementsC (matlabtypesubstitute vectorIn)

  genssiRemoveZeroElements removes zero columns from a row vecor

4.9.1 Function Documentation

4.9.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroElementsC (matlabtypesubstitute *vectorIn*)

Parameters

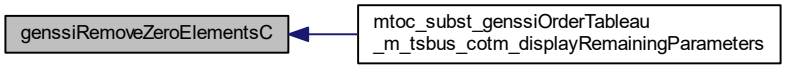
vectorIn	input (array)

Return values

vectorOut	output (array)
keepBoolean	boolean vector of indices kept (array)
keepIndex	vector of indices kept (array)

Definition at line 17 of file genssiRemoveZeroElementsC.m.

Here is the caller graph for this function:



4.10 genssiRemoveZeroElementsR.m File Reference

genssiRemoveZeroElements removes zero columns from a row vecor

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroElementsR (matlabtypesubstitute vectorIn)

  genssiRemoveZeroElements removes zero columns from a row vecor

4.10.1 Function Documentation

4.10.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroElementsR (matlabtypesubstitute *vectorIn*)

Parameters

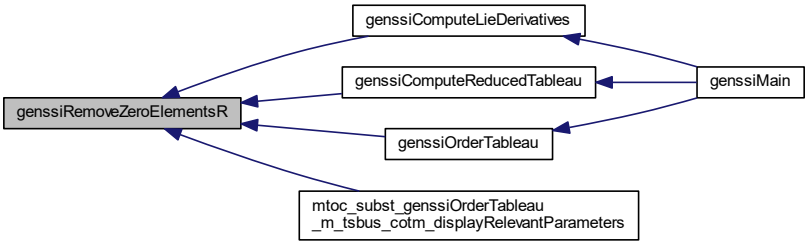
vectorIn	input (array)

Return values

vectorOut	output (array)
keepBoolean	boolean vector of indices kept (array)
keepIndex	vector of indices kept (array)

Definition at line 17 of file genssiRemoveZeroElementsR.m.

Here is the caller graph for this function:



4.11 genssiRemoveZeroRows.m File Reference

genssiRemoveZeroRows removes zero rows from a matrix

Functions

- mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroRows (matlabtypesubstitute matrixIn)

  genssiRemoveZeroRows removes zero rows from a matrix

4.11.1 Function Documentation

4.11.1.1 mlhsSubst< mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute >,mlhsInnerSubst< matlabtypesubstitute > > genssiRemoveZeroRows (matlabtypesubstitute *matrixIn*)

Parameters

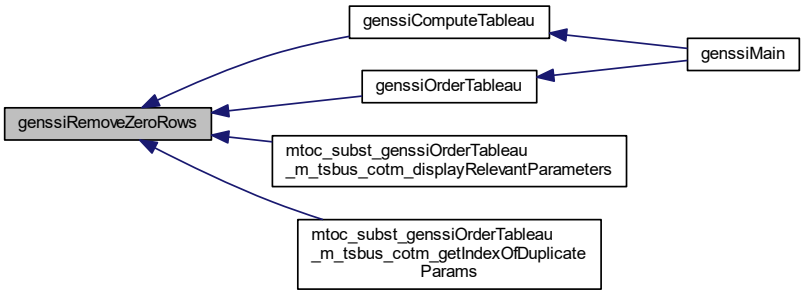
matrixIn	input (matrix)

Return values

matrixOut	output (matrix)
keepBoolean	boolean vector of indices kept (array)
keepIndex	vector of indices keept (array)

Definition at line 17 of file genssiRemoveZeroRows.m.

Here is the caller graph for this function:



4.12 genssiReportInputs.m File Reference

genssiReportInputs reports inputs, i.e. model definition.

Functions

- mlhsInnerSubst< matlabtypesubstitute > genssiReportInputs (matlabtypesubstitute model, matlabtypesubstitute options)

  genssiReportInputs reports inputs, i.e. model definition.

4.12.1 Function Documentation

4.12.1.1 mlhsInnerSubst< matlabtypesubstitute > genssiReportInputs (matlabtypesubstitute *model,* matlabtypesubstitute *options*)

Parameters

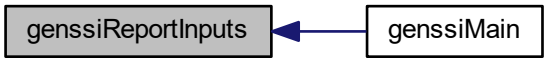
model	model definition (struct)
options	options (struct)

Return values

options	options (struct)

Definition at line 17 of file genssiReportInputs.m.

Here is the caller graph for this function:



4.13 genssiReportResults.m File Reference

genssiReportResults reports the results of the analysis.

Functions

- mlhsInnerSubst< matlabtypesubstitute > genssiReportResults (matlabtypesubstitute model, matlabtypesubstitute results, matlabtypesubstitute options)

  genssiReportResults reports the results of the analysis.

4.13.1 Function Documentation

4.13.1.1 mlhsInnerSubst< matlabtypesubstitute > genssiReportResults (matlabtypesubstitute *model,* matlabtypesubstitute *results,* matlabtypesubstitute *options*)

Parameters

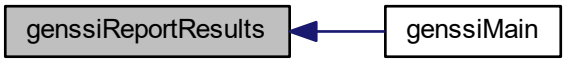
model	model definition (struct)
results	results of previous steps (struct)
options	options (struct)

Return values

options	options (struct)

Definition at line 17 of file genssiReportResults.m.

Here is the caller graph for this function:



4.14 genssiStartup.m File Reference

genssiStartup adds all paths reqquired for GenSSI. It should be called at the beginning of a session.

Functions

- noret::substitute genssiStartup ()

  genssiStartup adds all paths reqquired for GenSSI. It should be called at the beginning of a session.

4.15 genSsiStructToSource.m File Reference

genSsiStructToSource converts a model definition (struct) to a source format (Matlab function file) ans saves the results in the examples directory.

Functions

- noret::substitute genSsiStructToSource (matlabtypesubstitute model)

  genSsiStructToSource converts a model definition (struct) to a source format (Matlab function file) ans saves the results in the examples directory.

4.15.1 Function Documentation

4.15.1.1 noret::substitute genSsiStructToSource (matlabtypesubstitute *model*)

Parameters

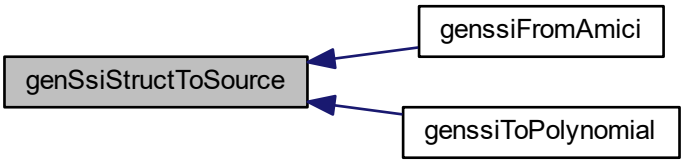
model	model definition (struct)

Return values

model	void

Definition at line 17 of file genSsiStructToSource.m.

Here is the caller graph for this function:



4.16 genssiToAmici.m File Reference

GenSsiToAmici converts a GenSSI model to AMICI model format and saves the results in the examples directory.

Functions

- mlhsInnerSubst< matlabtypesubstitute > genssiToAmici (matlabtypesubstitute modelNameIn, matlabtypesubstitute modelNameOut)

  GenSsiToAmici converts a GenSSI model to AMICI model format and saves the results in the examples directory.

4.16.1 Function Documentation

4.16.1.1 mlhsInnerSubst< matlabtypesubstitute > genssiToAmici (matlabtypesubstitute *modelNameIn,* matlabtypesubstitute *modelNameOut*)

Parameters

modelNameIn	name of the GenSSI model (string)
modelNameOut	name of the AMICI model (string)

Return values

modelNameOut	void

Definition at line 17 of file genssiToAmici.m.

4.17 genssiToPolynomial.m File Reference

genssiToPolynomial converts a GenSSI model to polynomial form. It reads the input model, converts to polynomial form, and creates an output model as a Matlab function modelNameOut.m and as a Matlab file modelnameOut.mat, both in the Examples folder.

Functions

- mlhsInnerSubst< matlabtypesubstitute > genssiToPolynomial (matlabtypesubstitute modelNameIn, matlabtypesubstitute modelNameOut)

  genssiToPolynomial converts a GenSSI model to polynomial form. It reads the input model, converts to polynomial form, and creates an output model as a Matlab function modelNameOut.m and as a Matlab file modelnameOut.mat, both in the Examples folder.

4.17.1 Function Documentation

4.17.1.1 mlhsInnerSubst< matlabtypesubstitute > genssiToPolynomial (matlabtypesubstitute *modelNameIn,* matlabtypesubstitute *modelNameOut*)

Parameters

modelNameIn	the name of the input model (a string)
modelNameOut	the name of the output model (a string)

Return values

modelNameOut	void

Definition at line 17 of file genssiToPolynomial.m.

Here is the call graph for this function:

Index