RodSystemEstimator

Generated by Doxygen 1.9.3

Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 4

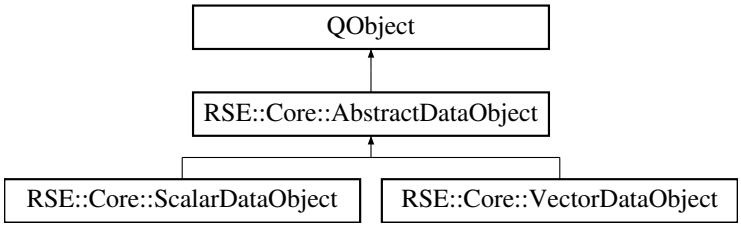
Class Documentation

4.1 RSE::Core::AbstractDataObject Class Reference

Data object which is designied in the way to be represented in a table easily.

`#include <abstractdataobject.h>`

Inheritance diagram for RSE::Core::AbstractDataObject:



Public Types

- enum **ObjectType** { **kScalar** , **kVector** , **kMatrix** , **kSurface** }

Public Member Functions

- **AbstractDataObject** (ObjectType type, QString const &name)

  Base constructor.
- virtual AbstractDataObject ∗ clone () const =0
- virtual DataItemType & addItem (DataKeyType key)=0
- void **removeItem** (DataValueType key)

  Remove the entity paired to the specified key.
- bool **changeItemKey** (DataKeyType oldKey, DataKeyType newKey, DataHolder ∗items=nullptr)

  Modify an existing key.
- bool **setArrayValue** (DataKeyType key, DataValueType newValue, IndexType iRow=0, IndexType iColumn=0)

  Set an array value with the specified indices.
- DataValueType **arrayValue** (DataKeyType key, IndexType iRow=0, IndexType iColumn=0)

  Retrieve a value from an array.

- std::vector< DataKeyType > **keys** () const

  Retrieve all the keys.
- quint32 **numberItems** () const
- DataHolder const & **getItems** ()
- DataIDType **id** () const
- ObjectType **type** () const
- QString const & **name** () const
- void **setName** (QString const &name)
- virtual void **serialize** (QDataStream &stream) const

  Serialize an abstract data object.
- virtual void deserialize (QDataStream &stream)

  Partly deserialize an abstract data object.
- virtual void import (QTextStream &stream)=0
- void **write** (QTextStream &stream) const

  Write an abstract data object to a file.

Static Public Member Functions

- static DataIDType **maxObjectID** ()
- static void **setMaxObjectID** (DataIDType iMaxObjectID)

Protected Attributes

- const ObjectType **mkType**
- QString **mName**
- DataIDType **mID**
- DataHolder **mItems**

Static Private Attributes

- static DataIDType **smMaxObjectID** = 0

Friends

- QDataStream & **operator**<< (QDataStream &stream, AbstractDataObject const &obj)

  Print a data object to a binary stream.

4.1.1 Detailed Description

Data object which is designied in the way to be represented in a table easily.

4.1.2 Member Function Documentation

4.1.2.1 addItem()

```
virtual DataItemType & RSE::Core::AbstractDataObject::addItem (
            DataKeyType key )  [pure virtual]
```

Implemented in RSE::Core::ScalarDataObject, and RSE::Core::VectorDataObject.

4.1.2.2 clone()

```
virtual AbstractDataObject * RSE::Core::AbstractDataObject::clone ( ) const  [pure virtual]
```

Implemented in RSE::Core::ScalarDataObject, and RSE::Core::VectorDataObject.

4.1.2.3 deserialize()

```
void AbstractDataObject::deserialize (
            QDataStream & stream )  [virtual]
```

Partly deserialize an abstract data object.

It is assumed that a type and name have already been assigned. So, only an identifier and items need to be set.

4.1.2.4 import()

```
virtual void RSE::Core::AbstractDataObject::import (
            QTextStream & stream )  [pure virtual]
```

Implemented in RSE::Core::ScalarDataObject, and RSE::Core::VectorDataObject.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/abstractdataobject.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/abstractdataobject.cpp

4.2 RSE::Core::Array< T > Class Template Reference

Numerical array class.

```
#include <array.h>
```

Classes

- class Row

  Proxy class to acquire a row by index.

Public Member Functions

- **Array** (IndexType numRows=0, IndexType numCols=0)
- **Array** (Array< T > const &another)

  Copy constructor.
- **Array** (Array< T > &&another)

  Move constructor.
- T * **data** ()
- void **resize** (IndexType numRows, IndexType numCols)

  Resize and copy previous values if possible.
- void **removeColumn** (IndexType iRemoveColumn)

  Remove a column by index.
- void **swapColumns** (IndexType iFirstColumn, IndexType iSecondColumn)

  Swap two columns.
- void **clear** ()

  Remove all the values.
- IndexType **rows** () const
- IndexType **cols** () const
- IndexType **size** () const
- Row< T > **operator[ ]** (IndexType iRow)
- Row< T > **operator[ ]** (IndexType iRow) const
- Array & **operator=** (Array< T > const &another)

  Assignment operator.

Private Attributes

- IndexType **mNumRows**

  Number of rows.
- IndexType **mNumCols**

  Number of columns.
- T * **mpData** = nullptr

  Pointer to the data stored.

Friends

- template<typename K >
  QDebug **operator**<< (QDebug stream, Array< K > &array)

  Print all array values using the matrix format.
- template<typename K >
  QDataStream & **operator**<< (QDataStream &stream, Array< K > const &array)

  Write an array to a binary stream.
- template<typename K >
  QDataStream & **operator**>> (QDataStream &stream, Array< K > &array)

  Read an array from a stream.
- template<typename K >
  QTextStream & **operator**<< (QTextStream &stream, Array< K > const &array)

  Write an array to a text stream.

4.2.1 Detailed Description

template<typename T>
class RSE::Core::Array< T >

Numerical array class.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/array.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/array.cpp

4.3 RSE::Core::Cable Struct Reference

Mechanical properties of a cable.

`#include <databasecables.h>`

Public Attributes

- std::string **name**

  Name of a cable.
- double **bendingStiffness**

  Bending stiffness, N.
- double **torsionalStiffness**

  Torsional stiffness, N.
- double **massPerLength**

  Mass per length, kg/m.
- double **youngsModulus**

  Youngs modulus, Pa.
- double **area**

  Area of a cross-section, m^2.

4.3.1 Detailed Description

Mechanical properties of a cable.

The documentation for this struct was generated from the following file:

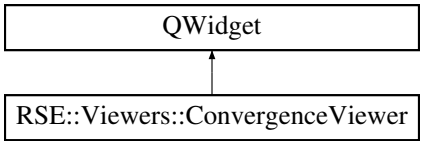
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/databasecables.h

4.4 RSE::Viewers::ConvergenceViewer Class Reference

Class to represent convergence of viscosities.

`#include <convergenceviewer.h>`

Inheritance diagram for RSE::Viewers::ConvergenceViewer:



Public Member Functions

- **ConvergenceViewer** (QString const &pathFile, QWidget ∗pParent=nullptr)
- void **plot** ()

  Represent the convergence.

Private Member Functions

- void **initialize** ()

  Initialize the widget.
- bool **read** ()

  Read the file contained viscosities of dampers.

Private Attributes

- QString const **mkPathFile**
- QCustomPlot ∗ **mpFigure**
- QStringList **mAvailableColors**
- QVector< QCPScatterStyle::ScatterShape > **mAvailableShapes**
- QVector< int > **mCalcModes**
- Core::Array< double > **mDampingValues**

4.4.1 Detailed Description

Class to represent convergence of viscosities.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/viewers/convergenceviewer.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/viewers/convergenceviewer.cpp

4.5 RSE::Core::Damper Class Reference

Class to compute and collect properties of a damper.

`#include <damper.h>`

Public Member Functions

- **Damper** (double massCable, double massLoadedCable, double workingLength, double bouncerLength, double springLength=0, double springStiffness=0)
- double **massCable** () const
- double **massLoadedCable** () const
- double **workingLength** () const
- double **bouncerLength** () const
- double **springLength** () const
- double **springStiffness** () const
- void **setMassCable** (double massCable)
- void **setMassLoadedCable** (double massLoadedCable)
- void **setWorkingLength** (double workingLength)
- void **setBouncerLength** (double bouncerLength)
- void **setSpringLength** (double springLength)
- void **setSpringStiffness** (double springStiffness)
- void **computeSpring** ()

  Compute parameters of a spring belonged to a damper.

Private Attributes

- double **mMassCable**

  Mass of a cable, kg.
- double **mMassLoadedCable**

  Mass of a cable with ice on it, kg.
- double **mWorkingLength**

  Working length, m.
- double **mBouncerLength**

  Length of a bouncer, m.
- double **mSpringLength** = 0.0

  Length of a spring, m.
- double **mSpringStiffness** = 0.0

  Spring stiffness, N/m.

4.5.1 Detailed Description

Class to compute and collect properties of a damper.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/damper.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/damper.cpp

4.6 RSE::Core::DataBaseCables Class Reference

Aggregate data of cables.

`#include <databasecables.h>`

Public Member Functions

- **DataBaseCables** (QString const &directory, QString const &fileName)
- std::vector< std::string > **names** () const

  Names of available cables.
- Cable const & **getItem** (std::string const &name) const

Private Member Functions

- bool **readDataBase** (QString const &pathFile)

  Read a database from a file.

Private Attributes

- std::unordered_map< std::string, Cable > **mData**

4.6.1 Detailed Description

Aggregate data of cables.

The documentation for this class was generated from the following files:

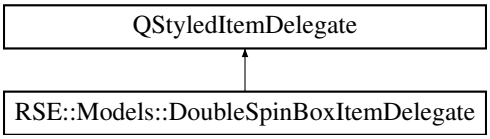
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/databasecables.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/databasecables.cpp

4.7 RSE::Models::DoubleSpinBoxItemDelegate Class Reference

Class to specify how table values can be edited.

`#include <doublespinboxitemdelegate.h>`

Inheritance diagram for RSE::Models::DoubleSpinBoxItemDelegate:



Public Member Functions

- **DoubleSpinBoxItemDelegate** (QObject ∗parent=nullptr)
- QWidget ∗ **createEditor** (QWidget ∗parent, const QStyleOptionViewItem &option, const QModelIndex &index) const override

  Create a double value editor.
- void **setEditorData** (QWidget ∗pEditor, const QModelIndex &index) const override

  Specify data to show.
- void **setModelData** (QWidget ∗pEditor, QAbstractItemModel ∗pModel, const QModelIndex &index) const override

  Set data to a model.
- void **updateEditorGeometry** (QWidget ∗pEditor, const QStyleOptionViewItem &option, const QModelIndex &index) const override

  Set a geometry to render.

4.7.1 Detailed Description

Class to specify how table values can be edited.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/central/doublespinboxitemdelegate.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/central/doublespinboxitemdelegate.cpp

4.8 KLP::EnergyFrame Struct Reference

Energy quantities associated with a frame.

`#include <framecollection.h>`

Public Attributes

- FloatFrameObject **kinetic**
- FloatFrameObject **potential**
- FloatFrameObject **full**

4.8.1 Detailed Description

Energy quantities associated with a frame.

The documentation for this struct was generated from the following file:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/framecollection.h

4.9 KLP::FrameCollection Struct Reference

Set of all quantities belonged to a frame.

`#include <framecollection.h>`

Public Attributes

- int **numRods**

  Number of rods.
- FloatFrameObject **parameter**

  Parameter.
- FloatFrameObject **naturalLength**

  Natural length.
- FloatFrameObject **accumulatedNaturalLength**
- FloatFrameObject **coordinates** [kNumDirections]

  Coordinates.
- StateFrame **state**

  Regular state.
- StateFrame **projectedState**

  Projected regular state.
- StateFrame **firstDerivativeState**

  First-order derivate of the state with respect to time.
- StateFrame **secondDerivativeState**

  Second-order derivate of the state with respect to time.
- StateFrame **errorState**

  State error.
- FloatFrameObject **strain**

  Strain.
- std::vector< StateFrame > **modalStates**

  Set of modal states.
- FloatFrameObject **frequencies**

  Frequencies.
- EnergyFrame **energy**

  Energy.

4.9.1 Detailed Description

Set of all quantities belonged to a frame.

The documentation for this struct was generated from the following file:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/framecollection.h

4.10 KLP::FrameObject< T > Class Template Reference

Public Types

- using **iterator** = FrameObjectIterator< T >

Public Member Functions

- **FrameObject** (T const *pData=nullptr, T normFactor=1.0, qint64 size=0, qint64 step=1)
- bool **isEmpty** () const
- qint64 **size** () const
- iterator **begin** ()
- iterator **end** ()
- iterator **operator[ ]** (int index)

Private Attributes

- T const * **mpData**
- T **mNormFactor**
- qint64 **mSize**
- qint64 **mStep**

Friends

- template<typename K >
  QDebug **operator<<** (QDebug stream, FrameObject< K > &frameObject)

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobject.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobject.cpp

4.11 KLP::FrameObjectIterator< T > Class Template Reference

Class to iterate through data of a record.

`#include <frameobjectiterator.h>`

Public Types

- using **self_type** = FrameObjectIterator< T >
- using **iterator_category** = std::random_access_iterator_tag
- using **difference_type** = std::ptrdiff_t
- using **value_type** = T
- using **pointer** = T const *
- using **reference** = T const &

Public Member Functions

- **FrameObjectIterator** (pointer pData, T normFactor, qint64 step)
- value_type **operator*** ()
- self_type & **operator++** ()
- self_type **operator++** (int)
- self_type **operator+** (const difference_type &movement)
- difference_type **operator-** (const FrameObjectIterator &another) const

Private Attributes

- pointer **mpData**
- T **mNormFactor**
- qint64 const **mStep**

Friends

- bool **operator==** (self_type const &first, self_type const &second)
- bool **operator!=** (self_type const &first, self_type const &second)

4.11.1 Detailed Description

template<typename T>
class KLP::FrameObjectIterator< T >

Class to iterate through data of a record.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobjectiterator.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobjectiterator.cpp

4.12 KLP::Index Struct Reference

Structure to navigate through records.

`#include <index.h>`

Public Member Functions

- **Index** ()

  Base constructor.

Public Attributes

- std::vector< IndexData > **data**

  Data.
- quint64 **recordShift** = 0

  Shift of the main record.
- quint64 **relativeDataShift** = 0

  Relative shift of data.

4.12.1 Detailed Description

Structure to navigate through records.

The documentation for this struct was generated from the following file:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/index.h

4.13 KLP::IndexData Struct Reference

Data of each record.

`#include <index.h>`

Public Attributes

- qint64 **position** = 0

  Position of a record in the buffer.
- qint64 **size** = 0

  Size of a record.
- qint64 **step** = 1

  Step for iterating inside a record.
- qint64 **partSize** = 0

  Partial length of a quantity inside a record.

4.13.1 Detailed Description

Data of each record.

The documentation for this struct was generated from the following file:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/index.h

4.14 RSE::Core::IO Class Reference

Class to save the project and solution data.

`#include <io.h>`

Public Member Functions

- **IO** (QString const &lastPath)
- QString const & **lastPath** () const
- QString const & **extension** () const
- void **saveAs** (QString const &pathFile, Project &project, Solution::SolutionOptions &options)

  Save the project and solution data to a file.
- IOPair **open** (QString const &pathFile, DataBaseCables const &dataBaseCables)

  Read the computational data from a file.

Private Attributes

- const QString **mkProjectExtension** = ".rse"
- QString **mLastPath**

4.14.1 Detailed Description

Class to save the project and solution data.

The documentation for this class was generated from the following files:

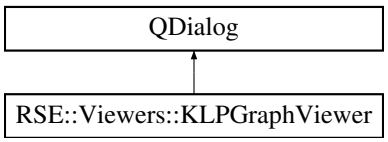
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/io.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/io.cpp

4.15 RSE::Viewers::KLPGraphViewer Class Reference

Class to graphically represent content of KLP output files.

`#include <klpgraphviewer.h>`

Inheritance diagram for RSE::Viewers::KLPGraphViewer:



Public Member Functions

- **KLPGraphViewer** (QString const &lastPath, QSettings &settings, QWidget *pParent=nullptr)
- void **openResultsDialog** ()

  Open results using a file system dialog.
- void **openResults** (QStringList const &locationFiles)

  Open a set of results using their locations.

Private Member Functions

- void **initialize** ()

  Intialize default graphical objects.
- void **createContent** ()

  Construct graphical interface.
- ads::CDockWidget * **createResultWidget** ()

  Create a widget to open and deal with KLP results.
- ads::CDockWidget * **createFigureWidget** ()

  Create a widget to plot graphs.
- ads::CDockWidget * **createConstructorWidget** ()

  Create a widget to construct graphs.
- ads::CDockWidget * **createPropertyWidget** ()

  Create a widget to modify properties of graphs.
- void **saveSettings** ()

  Save settings to a file.
- void **restoreSettings** ()

  Restore settings from a file.
- void **closeEvent** (QCloseEvent *pEvent) override

  Save settings and delete handling widgets before closing the window.

Private Attributes

- QString **mLastPath**
- QSettings & **mSettings**
- ads::CDockManager ∗ **mpDockManager** = nullptr
- QCustomPlot ∗ **mpFigure**
- std::vector< KLP::Result > **mResults**

4.15.1 Detailed Description

Class to graphically represent content of KLP output files.

The documentation for this class was generated from the following files:

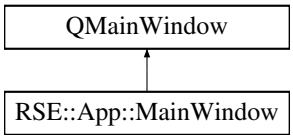
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/viewers/klpgraphviewer.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/viewers/klpgraphviewer.cpp

4.16 RSE::App::MainWindow Class Reference

Central window of the program.

`#include <mainwindow.h>`

Inheritance diagram for RSE::App::MainWindow:



Public Member Functions

- **MainWindow** (QWidget ∗parent=nullptr)
- void **setMassCable** (double value)

  Set mass of a cable.
- void **setMassLoadedCable** (double value)

  Set mass of a cable with ice on it.
- void **setWorkingLength** (double value)

  Specify working length.
- void **setBouncerLength** (double value)

  Set length of a bouncer.
- void **setSpringLength** (double value)

  Assingn length of a spring.
- void **setSpringStiffness** (double value)

  Set spring stiffness of a damper.
- void **setCable** (QString const &name)

  Assign cables to a rod system.
- void **setForce** (double value)

Specify stretching force.

- void **setLongitudinalStiffness** (double value)

  Specify longitudinal stiffness of all supports.
- void **setVerticalStiffness** (double value)

  Specify vertical stiffness of all supports.
- void **createProject** ()

  Open a new project.
- void **openProjectDialog** ()

  Open a project by means of a dialog window.
- void **openProject** (QString const &pathFile)

  Open a project using a path specified.
- void **saveAsProject** ()

  Save the project using a dialog window.
- void **saveProject** ()

  Save the current project.

Private Slots

- void **saveSettings** ()

  Save current graphical settings of floating widgets.
- void **restoreSettings** ()

  Read graphical settings from a file.
- void **computeSpring** ()

  Compute parameters of a spring.
- void **computeSpans** ()

  Compute length of all cables.
- void **runRodSystemSolution** ()

  Solve the rod system.
- void **runOptimizationSolution** ()

  Optimize viscosities of dampers.
- void **appendOutputData** (QByteArray const &data)

  Process the message from the solution process.
- void **showConvergence** ()

  Represent the convergence of the optimization process.
- void **showResults** ()

  Represent the results obtained via KLPALGSYS.
- void **setProjectTitle** ()

  Set the name of a project.
- void **setProjectData** ()

  Set project data.
- void **setSolutionOptions** ()

  Set the data to be used as the solution parameters.
- void **setCurrentCable** ()

  Select a current cable.
- void **setBlockedSignals** (bool)

  (Un)Block all the signals from widget
- void **aboutProgram** ()

  Show the information about the program.

Private Member Functions

- void **initialize** ()

  Set the state and geometry of the central window.
- void **createContent** ()

  Create all the widgets and links between them.
- void **createDefaultProject** ()

  Create a default project.
- void **createDefaultSolutionOptions** ()

  Create default solution options.
- void **closeEvent** (QCloseEvent ∗pEvent) override

  Save settings and parameters of project while closing the central window.
- ads::CDockWidget ∗ **createDamperWidget** ()

  Create a widget to specify data of a damper.
- ads::CDockWidget ∗ **createRodSystemWidget** ()

  Create a widget to set and control data of a rod system.
- ads::CDockWidget ∗ **createSupportWidget** ()

  Create a widget to specify data of supports.
- ads::CDockWidget ∗ **createCalculationWidget** ()

  Create a widget to control the solution process.
- ads::CDockWidget ∗ **createConsole** ()

  Construct a widget to view solution information.
- void **specifyMenuConnections** ()

  Specify menu interactions.

Private Attributes

- Ui::MainWindow ∗ **mpUi**
- ads::CDockManager ∗ **mpDockManager**
- Models::RodSystemTableModel ∗ **mpRodSystemTableModel**
- Models::DoubleSpinBoxItemDelegate ∗ **mpDoubleSpinBoxItemDelegate**
- QDoubleSpinBox ∗ **mpMassCable**
- QDoubleSpinBox ∗ **mpMassLoadedCable**
- QDoubleSpinBox ∗ **mpWorkingLength**
- QDoubleSpinBox ∗ **mpBouncerLength**
- QDoubleSpinBox ∗ **mpSpringLength**
- QDoubleSpinBox ∗ **mpSpringStiffness**
- QComboBox ∗ **mpNameCable**
- QDoubleSpinBox ∗ **mpForce**
- QDoubleSpinBox ∗ **mpLongitudinalStiffness**
- QDoubleSpinBox ∗ **mpVerticalStiffness**
- QSpinBox ∗ **mpNumCalcModes**
- QSpinBox ∗ **mpNumDampModes**
- QSpinBox ∗ **mpStepModes**
- QDoubleSpinBox ∗ **mpTolTrunc**
- QTextEdit ∗ **mpConsole**
- RSE::Core::Project ∗ **mpProject**
- RSE::Solution::SolutionManager ∗ **mpSolutionManager**
- RSE::Solution::SolutionOptions ∗ **mpSolutionOptions**
- RSE::Core::IO ∗ **mpIO**
- QSharedPointer< QSettings > **mpSettings**

4.16.1 Detailed Description

Central window of the program.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/central/mainwindow.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/central/mainwindow.cpp

4.17 RSE::Core::Project Class Reference

Public Member Functions

- **Project** (QString const &name, DataBaseCables dataBaseCables, Damper damper, RodSystem rodSystem, Support support)
- QString const & **name** () const
- void **setName** (QString const &name)
- Damper & **damper** ()
- RodSystem & **rodSystem** ()
- Support & **support** ()
- DataBaseCables const & **dataBaseCables** () const
- void **readTemplateData** (QString const &path)

  Read template data.
- void **writeCalcData** (QString const &path, Solution::SolutionOptions const &options)

  Write the computational data.

Private Member Functions

- AbstractDataObject * **addDataObject** (AbstractDataObject::ObjectType type)

  Create a data object with the specified type.
- void **importDataObjects** (QString const &path, QString const &fileName)

  Import several data objects from a file.
- void **readProjectID** (QString const &path)

  Read the identifier of a project.
- void **modifyScalarDataObjects** ()

  Modify scalar data objects.
- void **modifyVectorDataObjects** (Spans const &spans)

  Modify vector data objects.
- void **writeDataObjects** (DataObjects const &dataObjects, QString const &path, QString const &fileName)

  Write data objects to a file.
- void **writeRods** (QString const &path, QString const &fileName)

  Write data of rods.
- void **writeProgram** (QString const &path, QString const &fileName, int numRods, int numCalcModes)

  Write data of a program.

Private Attributes

- QString **mName**

  Name of a project.
- Damper **mDamper**

  Parameters of a damper.
- RodSystem **mRodSystem**

  Parameters of a rod system.
- Support **mSupport**

  Parameters of supports.
- DataBaseCables **mDataBaseCables**

  Database of cables.
- DataObjects **mScalarDataObjects**

  Data objects.
- DataObjects **mVectorDataObjects**
- int **mProjectID**

  Project identifier.
- QStringList **mRods**

  Content of the file named RODS.
- QStringList **mProgram**

  Content of the file name PROG.

Static Private Attributes

- static const QString **skProjectExtension**

  Project extension.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/project.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/project.cpp

4.18 KLP::Result Class Reference

Class to aggregate all the records.

`#include <result.h>`

Public Member Functions

- **Result** (QString const &pathFile)
- bool **isEmpty** () const
- std::vector< float > const & **time** () const
- QString const & **pathFile** () const
- int **numRods** (qint64 iFrame) const

  Get the number of rods associated with the requested frame.
- ResultInfo **info** () const

  Retrieve general information about a result file.
- FloatFrameObject **getFrameObject** (qint64 iFrame, RecordType type, float normFactor=1.0f, qint64 shift=0) const

  Get the object associated with the requested frame.
- FrameCollection **getFrameCollection** (qint64 iFrame) const

  Retrieve the collection of the frame objects.
- void **update** ()

  Retrieve the updated content from the file.

Private Member Functions

- bool **read** ()

  Read all the content of the file.
- void **buildIndex** ()

  Construct an object to navigate through records.
- void **setStateFrameData** (StateFrame &state, RecordType type, qint64 iFrame, qint64 iStartData, std::vector< float > const &normFactors) const

  Specify state data for each direction.

Private Attributes

- QString const **mkPathFile**

  Path to the KLP file.
- QByteArray **mContent**

  Content of the file.
- std::vector< Index > **mIndex**

  Index of the data buffer.
- qint64 **mNumRecords**

  Number of records.
- std::vector< float > **mTime**

  Time array.
- char **mNumBytesRod**

  Number of bytes per rod.

4.18.1 Detailed Description

Class to aggregate all the records.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/result.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/result.cpp

4.19 KLP::ResultInfo Struct Reference

Public Attributes

- uint **identifier**

  Unique identifier.
- QString **creationDate**

  Creation date.
- qint64 **numTotalRecords**

  Total number of records.
- qint64 **numTimeRecords**

  Number of time records.

The documentation for this struct was generated from the following file:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/result.h

4.20 RSE::Core::RodSystem Class Reference

Public Member Functions

- **RodSystem** (std::vector< double > distances, Cable const &cable, double force)
- std::vector< double > const & **distances** () const
- std::string const & **nameCable** () const
- double **force** () const
- int **numRods** () const
- double **massPerLength** () const
- void **setDistances** (std::vector< double > const &distances)

  Specify distances between supports.
- void **setCable** (Cable const &cable)

  Modify the cable used in the rod system.
- void **setForce** (double force)
- Spans **computeSpans** ()

  Compute characteristics of spans.

Private Attributes

- RodSystemParameters **mParameters**
- std::string **mNameCable**

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/rodsystem.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/rodsystem.cpp

4.21 RSE::Core::RodSystemParameters Struct Reference

Parameters of a rod system.

`#include <rodsystem.h>`

Public Attributes

- std::vector< double > **distances**

  Distance between supports, m.
- double **massPerLength**

  Mass per length, kg.
- double **youngsModulus**

  Youngs modulus, Pa.
- double **area**

  Area of a cross-section, m^2.
- double **force**

  Stretching force, N.
- int **numRods** = 0

  Number of rods.

4.21.1 Detailed Description

Parameters of a rod system.

The documentation for this struct was generated from the following file:

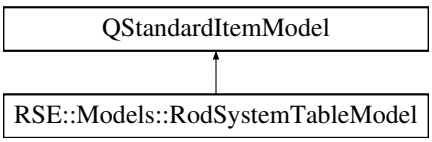
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/rodsystem.h

4.22 RSE::Models::RodSystemTableModel Class Reference

Table model to set and represent data of a rod system.

`#include <rodsystemtablemodel.h>`

Inheritance diagram for RSE::Models::RodSystemTableModel:



Signals

- void **modified** ()

Public Member Functions

- **RodSystemTableModel** (QObject *pParent=nullptr)
- void **setRodSystem** (Core::RodSystem *pRodSystem)

  Acquire the pointer to a rod system.
- void **updateContent** ()

  Represent all data of a rod system.
- void **insertAfterSelected** ()

  Insert fresh rows after selected ones.
- void **removeSelected** ()

  Remove the selected rows.

Private Member Functions

- void **clearContent** ()

  Remove all the objects created.
- void **setChangedData** (QStandardItem *pItem)

  Set the changed distances between supports.

Private Attributes

- Core::RodSystem * **mpRodSystem** = nullptr

4.22.1 Detailed Description

Table model to set and represent data of a rod system.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/central/rodsystemtablemodel.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/central/rodsystemtablemodel.cpp

4.23 RSE::Core::Array< T >::Row< U > Class Template Reference

Proxy class to acquire a row by index.

Public Member Functions

- **Row** (T *pData)
- T & **operator[ ]** (IndexType iCol)
- T const & **operator[ ]** (IndexType iCol) const
- T * **data** ()

Private Attributes

- T * **mpRow**

4.23.1 Detailed Description

template<typename T>
template<typename U>
class RSE::Core::Array< T >::Row< U >

Proxy class to acquire a row by index.

The documentation for this class was generated from the following file:

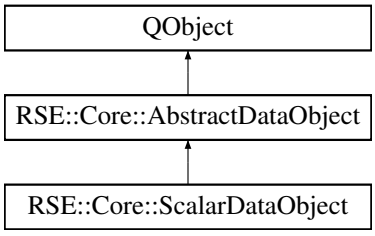
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/array.h

4.24 RSE::Core::ScalarDataObject Class Reference

Scalar data object.

`#include <scalardataobject.h>`

Inheritance diagram for RSE::Core::ScalarDataObject:



Public Member Functions

- **ScalarDataObject** (QString const &name)

  Construct a scalar data object.
- ~**ScalarDataObject** ()

  Decrease a number of instances while being destroyed.
- AbstractDataObject * clone () const override

  Clone a scalar data object.
- DataItemType & addItem (DataValueType key) override

  Insert a new item into ScalarDataObject.
- virtual void import (QTextStream &stream) override

  Import a scalar data object from a file.

Static Public Member Functions

- static quint32 **numberInstances** ()

Static Private Attributes

- static quint32 **smNumInstances** = 0

Additional Inherited Members

4.24.1 Detailed Description

Scalar data object.

4.24.2 Member Function Documentation

4.24.2.1 addItem()

```
DataItemType & ScalarDataObject::addItem (
            DataValueType key )  [override], [virtual]
```

Insert a new item into ScalarDataObject.

Implements RSE::Core::AbstractDataObject.

4.24.2.2 clone()

```
AbstractDataObject * ScalarDataObject::clone ( ) const  [override], [virtual]
```

Clone a scalar data object.

Implements RSE::Core::AbstractDataObject.

4.24.2.3 import()

```
void ScalarDataObject::import (
            QTextStream & stream )  [override], [virtual]
```

Import a scalar data object from a file.

Implements RSE::Core::AbstractDataObject.

The documentation for this class was generated from the following files:

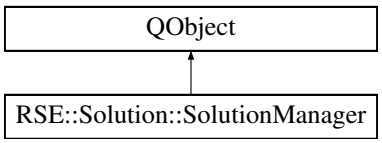
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/scalardataobject.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/scalardataobject.cpp

4.25 RSE::Solution::SolutionManager Class Reference

Class to control the solution process.

```
#include <solutionmanager.h>
```

Inheritance diagram for RSE::Solution::SolutionManager:



Public Slots

- void **stopSolution** ()
  Stop the solution process.

Signals

- void **outputSent** (QByteArray)
- void **rodSystemSolved** ()
- void **optimizationSolved** ()
- void **optimizationStepPerformed** ()

Public Member Functions

- **SolutionManager** (QString const &rootPath, QString const &relativeInputPath, QString const &relative↩ OutputPath)
- void **solveRodSystem** (Core::Project &project, SolutionOptions const &options)

  Solve a rod system.
- void **solveOptimization** (Core::Project &project, SolutionOptions const &options)

  Optimize viscosities of dampers as to damp selected set of modes.
- void **runVisualizer** ()

  Run the visualizer of a rod system.

Private Member Functions

- void **processRodSystemStream** ()

  Process the output of the rod system solver.
- void **processOptimizationStream** ()

  Process the optimization output.
- void **runParserProcess** ()

  Prepare data for the optimization process.
- void **writeOptimizationInput** (QString const &pathFile, int numDampers, SolutionOptions const &options)

  Write the input data for optimization of viscosities.
- int **getRodSystemStatus** ()

  Check if the solution process if finished.

Private Attributes

- QString **mRootPath**
- QString **mInputPath**
- QString **mOutputPath**
- QProcess * **mpRodSystemSolver** = nullptr
- QProcess * **mpOptimizationSolver** = nullptr

4.25.1 Detailed Description

Class to control the solution process.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/solutionmanager.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/solutionmanager.cpp

4.26 RSE::Solution::SolutionOptions Class Reference

Public Member Functions

- **SolutionOptions** (int numCalcModes, int numDampModes, int stepModes, double tolTrunc)
- int **numCalcModes** () const
- int **numDampModes** () const
- int **stepModes** () const
- double **tolTrunc** () const
- void **setNumCalcModes** (int numCalcModes)
- void **setNumDampModes** (int numDampModes)
- void **setStepModes** (int stepModes)
- void **setTolTrunc** (double tolTrunc)

Private Attributes

- int **mNumCalcModes**

  Number of computational modes.
- int **mNumDampModes**

  Number of modes to be damped.
- int **mStepModes**

  Step through computational modes.
- double **mTolTrunc**

  Limit to truncate computational modes.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/solutionoptions.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/solutionoptions.cpp

4.27 RSE::Core::Spans Struct Reference

Computed parameters of spans.

`#include <rodsystem.h>`

Public Member Functions

- **Spans** (int numRods)

Public Attributes

- std::vector< double > **u0**

  Constant at the left end.
- std::vector< double > **uL**

  Constant at the right end.
- std::vector< double > **L**

  Length of a rod, m.
- double **projectedForce**

  Projected stretching force, N.

4.27.1 Detailed Description

Computed parameters of spans.

The documentation for this struct was generated from the following file:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/rodsystem.h

4.28 KLP::StateFrame Struct Reference

Kinematic and dynamic quantities associated with a frame.

`#include <framecollection.h>`

Public Attributes

- FloatFrameObject **displacements** [kNumDirections]
- FloatFrameObject **rotations** [kNumDirections]
- FloatFrameObject **forces** [kNumDirections]
- FloatFrameObject **moments** [kNumDirections]

4.28.1 Detailed Description

Kinematic and dynamic quantities associated with a frame.

The documentation for this struct was generated from the following file:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/framecollection.h

4.29 RSE::Core::Support Class Reference

Class to aggregate data of supports.

`#include <support.h>`

Public Member Functions

- **Support** (double longitudinalStiffness, double verticalStiffness)
- double **longitudinalStiffness** () const
- double **verticalStiffness** () const
- void **setLongitudinalStiffness** (double longitudinalStiffness)
- void **setVerticalStiffness** (double verticalStiffness)

Private Attributes

- double **mLongitudinalStiffness**

  Longitudinal stiffness (1), N/m.
- double **mVerticalStiffness**

  Vertical stiffness (2), N/m.

4.29.1 Detailed Description

Class to aggregate data of supports.

The documentation for this class was generated from the following files:

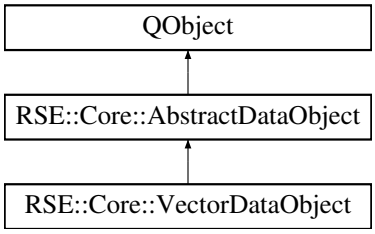
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/support.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/support.cpp

4.30 RSE::Core::VectorDataObject Class Reference

Vector data object.

`#include <vectordataobject.h>`

Inheritance diagram for RSE::Core::VectorDataObject:



Public Member Functions

- **VectorDataObject** (QString const &name)

  Construct a vector data object.
- ∼**VectorDataObject** ()

  Decrease a number of instances while being destroyed.
- AbstractDataObject ∗ clone () const override

  Clone a vector data object.
- DataItemType & addItem (DataValueType key) override

  Insert a new item into VectorDataObject.
- virtual void import (QTextStream &stream) override

  Import a vector data object from a file.

Static Public Member Functions

- static quint32 **numberInstances** ()

Static Private Attributes

- static quint32 **smNumInstances** = 0

Additional Inherited Members

4.30.1 Detailed Description

Vector data object.

4.30.2 Member Function Documentation

4.30.2.1 addItem()

```
DataItemType & VectorDataObject::addItem (
            DataValueType key )  [override], [virtual]
```

Insert a new item into VectorDataObject.

Implements RSE::Core::AbstractDataObject.

4.30.2.2 clone()

```
AbstractDataObject * VectorDataObject::clone ( ) const  [override], [virtual]
```

Clone a vector data object.

Implements RSE::Core::AbstractDataObject.

4.30.2.3 import()

```
void VectorDataObject::import (
            QTextStream & stream )  [override], [virtual]
```

Import a vector data object from a file.

Implements RSE::Core::AbstractDataObject.

The documentation for this class was generated from the following files:

- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/vectordataobject.h
- /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/vectordataobject.cpp

Chapter 5

File Documentation

5.1 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/central/doublespinboxitemdelegate.cpp File Reference

DoubleSpinBoxItemDelegate.

```
#include <QDoubleSpinBox>
#include "doublespinboxitemdelegate.h"
```

5.1.1 Detailed Description

DoubleSpinBoxItemDelegate.

Author

Date

2022

5.2 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/central/doublespinboxitemdelegate.h File Reference

DoubleSpinBoxItemDelegate.

```
#include <QStyledItemDelegate>
```

Classes

- class RSE::Models::DoubleSpinBoxItemDelegate

  Class to specify how table values can be edited.

5.2.1 Detailed Description

DoubleSpinBoxItemDelegate.

Author

Date

2022

5.3 doublespinboxitemdelegate.h

Go to the documentation of this file.

```
1
8 #ifndef DOUBLESPINBOXITEMDELEGATE_H
9 #define DOUBLESPINBOXITEMDELEGATE_H
10
11 #include <QStyledItemDelegate>
12
13 namespace RSE::Models
14 {
15
17 class DoubleSpinBoxItemDelegate : public QStyledItemDelegate
18 {
19 public:
20     DoubleSpinBoxItemDelegate(QObject* parent = nullptr);
21     QWidget* createEditor(QWidget* parent, const QStyleOptionViewItem& option, const QModelIndex& index)
      const override;
22     void setEditorData(QWidget* pEditor, const QModelIndex& index) const override;
23     void setModelData(QWidget* pEditor, QAbstractItemModel* pModel, const QModelIndex& index) const
      override;
24     void updateEditorGeometry(QWidget* pEditor, const QStyleOptionViewItem& option, const QModelIndex&
      index) const override;
25 };
26
27 }
28
29 #endif // DOUBLESPINBOXITEMDELEGATE_H
```

5.4 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/central/mainwindow.cpp File Reference

Definition of the MainWindow class.

```
#include <QVBoxLayout>
#include <QGridLayout>
#include <QLabel>
#include <QTextEdit>
#include <QDoubleSpinBox>
#include <QSpinBox>
#include <QSpacerItem>
#include <QSettings>
#include <QTableView>
#include <QHeaderView>
#include <QToolBar>
#include <QComboBox>
#include <QFileDialog>
#include <QMessageBox>
```

```
#include "DockManager.h"
#include "DockWidget.h"
#include "DockAreaWidget.h"
#include "ads_globals.h"
#include "mainwindow.h"
#include "ui_mainwindow.h"
#include "uiconstants.h"
#include "rodsystemtablemodel.h"
#include "doublespinboxitemdelegate.h"
#include "core/project.h"
#include "core/solutionoptions.h"
#include "core/solutionmanager.h"
#include "core/io.h"
#include "viewers/convergenceviewer.h"
#include "viewers/klpgraphviewer.h"
```

Functions

- QDoubleSpinBox * **createDoubleField** (double value, double maxValue=1e3, int numDecimals=3)

  Create a field to input a floating-point number.
- QSpinBox * **createIntegerField** (int value, int maxValue=1000)

  Create a field to input an integer.

5.4.1 Detailed Description

Definition of the MainWindow class.

Author

Pavel Lakiza

Date

July 2022

5.5 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/central/mainwindow.h File Reference

Declaration of the MainWindow class.

```
#include <QMainWindow>
```

Classes

- class RSE::App::MainWindow

  Central window of the program.

5.5.1 Detailed Description

Declaration of the MainWindow class.

Author

Pavel Lakiza

Date

July 2022

5.6 mainwindow.h

Go to the documentation of this file.

```
1
8 #ifndef MAINWINDOW_H
9 #define MAINWINDOW_H
10
11 #include <QMainWindow>
12
13 QT_BEGIN_NAMESPACE
14 namespace Ui
15 {
16 class MainWindow;
17 }
18 class QSettings;
19 class QDoubleSpinBox;
20 class QSpinBox;
21 class QTableView;
22 class QTextEdit;
23 class QProcess;
24 class QComboBox;
25 QT_END_NAMESPACE
26
27 namespace ads
28 {
29 class CDockManager;
30 class CDockWidget;
31 }
32
33 namespace RSE
34 {
35
36 namespace Core
37 {
38 class Project;
39 class IO;
40 }
41
42 namespace Solution
43 {
44 class SolutionManager;
45 class SolutionOptions;
46 }
47
48 namespace Models
49 {
50 class RodSystemTableModel;
51 class DoubleSpinBoxItemDelegate;
52 }
53
54 namespace App
55 {
56
58 class MainWindow : public QMainWindow
59 {
60     Q_OBJECT
61
62 public:
63     MainWindow(QWidget* parent = nullptr);
64     ~MainWindow();
65     // Set parameters of a damper
66     void setMassCable(double value);
67     void setMassLoadedCable(double value);
```

```
68      void setWorkingLength(double value);
69      void setBouncerLength(double value);
70      void setSpringLength(double value);
71      void setSpringStiffness(double value);
72      // Set parameters of a rod system
73      void setCable(QString const& name);
74      void setForce(double value);
75      // Set parameters of supports
76      void setLongitudinalStiffness(double value);
77      void setVerticalStiffness(double value);
78      // Deal with projects
79      void createProject();
80      void openProjectDialog();
81      void openProject(QString const& pathFile);
82      void saveAsProject();
83      void saveProject();
84
85  private:
86      // Content
87      void initialize();
88      void createContent();
89      void createDefaultProject();
90      void createDefaultSolutionOptions();
91      void closeEvent(QCloseEvent* pEvent) override;
92      ads::CDockWidget* createDamperWidget();
93      ads::CDockWidget* createRodSystemWidget();
94      ads::CDockWidget* createSupportWidget();
95      ads::CDockWidget* createCalculationWidget();
96      ads::CDockWidget* createConsole();
97      // Signals & Slots
98      void specifyMenuConnections();
99
100 private slots:
101     // Settings
102     void saveSettings();
103     void restoreSettings();
104     // Recompute
105     void computeSpring();
106     void computeSpans();
107     // Controlling the solution process
108     void runRodSystemSolution();
109     void runOptimizationSolution();
110     void appendOutputData(QByteArray const& data);
111     void showConvergence();
112     void showResults();
113     // Set project data
114     void setProjectTitle();
115     void setProjectData();
116     void setSolutionOptions();
117     void setCurrentCable();
118     void setBlockedSignals(bool);
119     void aboutProgram();
120
121 private:
122     // GUI
123     Ui::MainWindow* mpUi;
124     ads::CDockManager* mpDockManager;
125     Models::RodSystemTableModel* mpRodSystemTableModel;
126     Models::DoubleSpinBoxItemDelegate* mpDoubleSpinBoxItemDelegate;
127     // Parameters of a damper
128     QDoubleSpinBox* mpMassCable;
129     QDoubleSpinBox* mpMassLoadedCable;
130     QDoubleSpinBox* mpWorkingLength;
131     QDoubleSpinBox* mpBouncerLength;
132     QDoubleSpinBox* mpSpringLength;
133     QDoubleSpinBox* mpSpringStiffness;
134     // Parameters of a rod system
135     QComboBox* mpNameCable;
136     QDoubleSpinBox* mpForce;
137     // Parameters of supports
138     QDoubleSpinBox* mpLongitudinalStiffness;
139     QDoubleSpinBox* mpVerticalStiffness;
140     // Options of computational process
141     QSpinBox* mpNumCalcModes;
142     QSpinBox* mpNumDampModes;
143     QSpinBox* mpStepModes;
144     QDoubleSpinBox* mpTolTrunc;
145     QTextEdit* mpConsole;
146     // Project
147     RSE::Core::Project* mpProject;
148     RSE::Solution::SolutionManager* mpSolutionManager;
149     RSE::Solution::SolutionOptions* mpSolutionOptions;
150     RSE::Core::IO* mpIO;
151     // Settings
152     QSharedPointer<QSettings> mpSettings;
153 };
154
```

```
155 }
156
157 }
158
159 #endif // MAINWINDOW_H
```

5.7 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/central/rodsystemtablemodel.cpp File Reference

Definition of the RodSystemTableModel class.

```
#include <QTableView>
#include "rodsystemtablemodel.h"
#include "core/rodsystem.h"
```

5.7.1 Detailed Description

Definition of the RodSystemTableModel class.

Author

Pavel Lakiza

Date

July 2022

5.8 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/central/rodsystemtablemodel.h File Reference

Declaration of the RodSystemTableModel class.

```
#include <QStandardItemModel>
```

Classes

- class RSE::Models::RodSystemTableModel
  Table model to set and represent data of a rod system.

5.8.1 Detailed Description

Declaration of the RodSystemTableModel class.

Author

Pavel Lakiza

Date

July 2022

5.9 rodsystemtablemodel.h

Go to the documentation of this file.

```
1
8 #ifndef RODSYSTEMTABLEMODEL_H
9 #define RODSYSTEMTABLEMODEL_H
10
11 #include <QStandardItemModel>
12
13 namespace RSE
14 {
15
16 namespace Core
17 {
18 class RodSystem;
19 }
20
21 namespace Models
22 {
23
25 class RodSystemTableModel : public QStandardItemModel
26 {
27     Q_OBJECT
28
29 public:
30     RodSystemTableModel(QObject* pParent = nullptr);
31     ~RodSystemTableModel() = default;
32     void setRodSystem(Core::RodSystem* pRodSystem);
33     void updateContent();
34     void insertAfterSelected();
35     void removeSelected();
36
37 signals:
38     void modified();
39
40 private:
41     void clearContent();
42     void setChangedData(QStandardItem* pItem);
43
44 private:
45     Core::RodSystem* mpRodSystem = nullptr;
46 };
47
48 }
49
50 }
51
52
53
54 #endif // RODSYSTEMTABLEMODEL_H
```

5.10 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/central/uiconstants.h File Reference

Graphical constants shared between several widgets.

```
#include <QString>
```

Variables

- const QString **RSE::UiConstants::Settings::skGeometry** = "geometry"
- const QString **RSE::UiConstants::Settings::skState** = "state"
- const QString **RSE::UiConstants::Settings::skDockingState** = "dockingState"

5.10.1 Detailed Description

Graphical constants shared between several widgets.

Author

Pavel Lakiza

Date

July 2022

5.11 uiconstants.h

Go to the documentation of this file.

```
1
8 #ifndef UICONSTANTS_H
9 #define UICONSTANTS_H
10
11 #include <QString>
12
13 namespace RSE::UiConstants
14 {
15
16 namespace Settings
17 {
18 const QString skGeometry     = "geometry";
19 const QString skState        = "state";
20 const QString skDockingState = "dockingState";
21 }
22
23 }
24
25 #endif // UICONSTANTS_H
```

5.12 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/abstractdataobject.cpp File Reference

Implementation of the AbstractDataObject class.

```
#include "abstractdataobject.h"
#include "constants.h"
```

5.12.1 Detailed Description

Implementation of the AbstractDataObject class.

Author

Pavel Lakiza

Date

July 2022

5.13 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/abstractdataobject.h File Reference

Declaration of the AbstractDataObject class.

```
#include <QObject>
#include <QString>
#include <QDataStream>
#include <map>
#include "array.h"
#include "aliasdata.h"
```

Classes

- class RSE::Core::AbstractDataObject

  Data object which is designied in the way to be represented in a table easily.

Typedefs

- using **RSE::Core::DataItemType** = Array< DataValueType >
- using **RSE::Core::DataHolder** = std::multimap< DataKeyType, DataItemType >

Functions

- QDataStream & **RSE::Core::operator<<** (QDataStream &stream, AbstractDataObject const &obj)

  Print a data object to a binary stream.

5.13.1 Detailed Description

Declaration of the AbstractDataObject class.

Author

Pavel Lakiza

Date

July 2022

5.14 abstractdataobject.h

Go to the documentation of this file.

```
1
8 #ifndef ABSTRACTDATAOBJECT_H
9 #define ABSTRACTDATAOBJECT_H
10
11 #include <QObject>
12 #include <QString>
13 #include <QDataStream>
14 #include <map>
15 #include "array.h"
16 #include "aliasdata.h"
17
18 namespace RSE::Core
19 {
20
21 using DataItemType = Array<DataValueType>;
22 using DataHolder = std::multimap<DataKeyType, DataItemType>;
23
25 class AbstractDataObject : public QObject
26 {
27 public:
28     enum ObjectType
29     {
30         kScalar,
31         kVector,
32         kMatrix,
33         kSurface
34     };
35     AbstractDataObject(ObjectType type, QString const& name);
36     virtual ~AbstractDataObject() = 0;
37     virtual AbstractDataObject* clone() const = 0;
38     virtual DataItemType& addItem(DataKeyType key) = 0;
39     void removeItem(DataValueType key);
40     bool changeItemKey(DataKeyType oldKey, DataKeyType newKey, DataHolder* items = nullptr);
41     bool setArrayValue(DataKeyType key, DataValueType newValue, IndexType iRow = 0, IndexType iColumn =
       0);
42     DataValueType arrayValue(DataKeyType key, IndexType iRow = 0, IndexType iColumn = 0);
43     std::vector<DataKeyType> keys() const;
44     quint32 numberItems() const { return mItems.size(); }
45     DataHolder const& getItems() { return mItems; }
46     DataIDType id() const { return mID; }
47     ObjectType type() const { return mkType; }
48     QString const& name() const { return mName; }
49     void setName(QString const& name) { mName = name; }
50     static DataIDType maxObjectID() { return smMaxObjectID; }
51     static void setMaxObjectID(DataIDType iMaxObjectID) { smMaxObjectID = iMaxObjectID; }
52     virtual void serialize(QDataStream& stream) const;
53     virtual void deserialize(QDataStream& stream);
54     friend QDataStream& operator«(QDataStream& stream, AbstractDataObject const& obj);
55     virtual void import(QTextStream& stream) = 0;
56     void write(QTextStream& stream) const;
57
58 protected:
59     const ObjectType mkType;
60     QString mName;
61     DataIDType mID;
62     DataHolder mItems;
63
64 private:
65     static DataIDType smMaxObjectID;
66 };
67
69 inline QDataStream& operator«(QDataStream& stream, AbstractDataObject const& obj)
70 {
71     obj.serialize(stream);
72     return stream;
73 }
74
75 }
76
77 #endif // ABSTRACTDATAOBJECT_H
```

5.15 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/aliasdata.h File Reference

Specification of data types used in a project.

```
#include <QtGlobal>
```

Typedefs

- using **RSE::Core::DataValueType** = double
- using **RSE::Core::DataKeyType** = double
- using **RSE::Core::DataIDType** = qint64

5.15.1 Detailed Description

Specification of data types used in a project.

Author

Pavel Lakiza

Date

May 2021

5.16 aliasdata.h

Go to the documentation of this file.

```
1
8 #ifndef ALIASDATA_H
9 #define ALIASDATA_H
10
11 #include <QtGlobal>
12
13 namespace RSE::Core
14 {
15
16 using DataValueType = double;
17 using DataKeyType = double;
18 using DataIDType = qint64;
19
20 }
21
22 #endif // ALIASDATA_H
```

5.17 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/array.cpp File Reference

Implementation of the Array class.

```
#include "array.h"
```

5.17.1 Detailed Description

Implementation of the Array class.

Author

Pavel Lakiza

Date

March 2021

5.18 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/array.h File Reference

Declaration of the Array class.

```
#include <QDebug>
#include "constants.h"
```

Classes

- class RSE::Core::Array< T >
  Numerical array class.
- class RSE::Core::Array< T >::Row< U >
  Proxy class to acquire a row by index.

Typedefs

- using **RSE::Core::IndexType** = quint32

Functions

- template<typename K >
  QDebug **RSE::Core::operator**<< (QDebug stream, Array< K > &array)
  Print all array values using the matrix format.
- template<typename K >
  QDataStream & **RSE::Core::operator**<< (QDataStream &stream, Array< K > const &array)
  Write an array to a binary stream.
- template<typename K >
  QDataStream & **RSE::Core::operator**>> (QDataStream &stream, Array< K > &array)
  Read an array from a stream.
- template<typename K >
  QTextStream & **RSE::Core::operator**<< (QTextStream &stream, Array< K > const &array)
  Write an array to a text stream.

5.18.1 Detailed Description

Declaration of the Array class.

Author

Pavel Lakiza

Date

July 2022

5.19 array.h

Go to the documentation of this file.

```
1
8 #ifndef ARRAY_H
9 #define ARRAY_H
10
11 #include <QDebug>
12 #include "constants.h"
13
14 namespace RSE::Core
15 {
16
17 using IndexType = quint32;
18
20 template<typename T>
21 class Array
22 {
23 private:
24     template <typename U> class Row;
25
26 public:
27     Array(IndexType numRows = 0, IndexType numCols = 0);
28     Array(Array<T> const& another);
29     Array(Array<T>&& another);
30     ~Array();
31     T* data() { return mpData; }
32     void resize(IndexType numRows, IndexType numCols);
33     void removeColumn(IndexType iRemoveColumn);
34     void swapColumns(IndexType iFirstColumn, IndexType iSecondColumn);
35     void clear();
36     IndexType rows() const { return mNumRows; };
37     IndexType cols() const { return mNumCols; };
38     IndexType size() const { return mNumRows * mNumCols; }
39     Row<T> operator[](IndexType iRow) { return Row<T>(&mpData[mNumCols * iRow]); };
40     Row<T> operator[](IndexType iRow) const { return Row<T>(&mpData[mNumCols * iRow]); };
41     Array& operator=(Array<T> const& another);
42     template<typename K> friend QDebug operator<<(QDebug stream, Array<K>& array);
43     template<typename K> friend QDataStream& operator<<(QDataStream& stream, Array<K> const& array);
44     template<typename K> friend QDataStream& operator>>(QDataStream& stream, Array<K>& array);
45     template<typename K> friend QTextStream& operator<<(QTextStream& stream, Array<K> const& array);
46
47 private:
49     IndexType mNumRows;
51     IndexType mNumCols;
53     T* mpData = nullptr;
55     template <typename U>
56     class Row
57     {
58     public:
59         Row() = delete;
60         Row(T* pData) : mpRow(pData) { };
61         ~Row() { }
62         T& operator[](IndexType iCol) { return mpRow[iCol]; }
63         T const& operator[](IndexType iCol) const { return mpRow[iCol]; }
64         T* data() { return mpRow; }
65     private:
66         T* mpRow;
67     };
68 };
69
71 template<typename K>
```

```
72 inline QDebug operator«(QDebug stream, Array<K>& array)
73 {
74     IndexType const& nRows = array.mNumRows;
75     IndexType const& nCols = array.mNumCols;
76     stream = stream.noquote();
77     stream « QString("Array size: %1 x %2").arg(QString::number(nRows), QString::number(nCols));
78     stream « Qt::endl;
79     for (IndexType iRow = 0; iRow != nRows; ++iRow)
80     {
81         for (IndexType jCol = 0; jCol != nCols; ++jCol)
82             stream « QString::number(array[iRow][jCol]);
83         stream « Qt::endl;
84     }
85     return stream;
86 }
87
89 template<typename K>
90 inline QDataStream& operator«(QDataStream& stream, Array<K> const& array)
91 {
92     stream « array.mNumRows « array.mNumCols;
93     IndexType const& size = array.size();
94     for (IndexType i = 0; i != size; ++i)
95         stream « array.mpData[i];
96     return stream;
97 }
98
100 template<typename K>
101 inline QDataStream& operator»(QDataStream& stream, Array<K>& array)
102 {
103     delete[] array.mpData;
104     stream » array.mNumRows » array.mNumCols;
105     IndexType const& size = array.size();
106     array.mpData = new K[size];
107     for (IndexType i = 0; i != size; ++i)
108         stream » array.mpData[i];
109     return stream;
110 }
111
113 template<typename K>
114 inline QTextStream& operator«(QTextStream& stream, Array<K> const& array)
115 {
116     IndexType const& numRows = array.mNumRows;
117     IndexType const& numCols = array.mNumCols;
118     for (IndexType iRow = 0; iRow != numRows; ++iRow)
119     {
120         for (IndexType jCol = 0; jCol != numCols; ++jCol)
121             stream « QString::number(array[iRow][jCol], 'g', RSE::Constants::kWritingPrecision);
122         stream « Qt::endl;
123     }
124     return stream;
125 }
126
127 }
128
129 #endif // ARRAY_H
```

5.20 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/constants.h File Reference

Computational constants.

Variables

- const double **RSE::Constants::kGravitationalAcceleration** = 9.8067

  Gravitational acceleration, m/s^ 2.
- const int **RSE::Constants::kWritingPrecision** = 15

  Number of digits to be written to a file.

5.20.1 Detailed Description

Computational constants.

Author

Pavel Lakiza

Date

July 2022

5.21 constants.h

Go to the documentation of this file.

```
1
8 #ifndef CONSTANTS_H
9 #define CONSTANTS_H
10
11 namespace RSE::Constants
12 {
13
15 const double kGravitationalAcceleration = 9.8067;
16
18 const int kWritingPrecision = 15;
19
20 }
21
22 #endif // CONSTANTS_H
```

5.22 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/damper.cpp File Reference

Definition of the Damper class.

```
#include "damper.h"
#include "constants.h"
```

5.22.1 Detailed Description

Definition of the Damper class.

Author

Pavel Lakiza

Date

July 2022

5.23 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/damper.h File Reference

Declaration the Damper class.

`#include <QPair>`

Classes

- class RSE::Core::Damper

  Class to compute and collect properties of a damper.

5.23.1 Detailed Description

Declaration the Damper class.

Author

Pavel Lakiza

Date

July 2022

5.24 damper.h

Go to the documentation of this file.

```
1
8 #ifndef DAMPER_H
9 #define DAMPER_H
10
11 #include <QPair>
12
13 namespace RSE::Core
14 {
15
17 class Damper
18 {
19 public:
20     Damper(double massCable, double massLoadedCable, double workingLength, double bouncerLength,
21            double springLength = 0, double springStiffness = 0);
22     ~Damper() = default;
23     // Get parameteres of damper
24     double massCable() const { return mMassCable; }
25     double massLoadedCable() const { return mMassLoadedCable; }
26     double workingLength() const { return mWorkingLength; }
27     double bouncerLength() const { return mBouncerLength; }
28     double springLength() const { return mSpringLength; }
29     double springStiffness() const { return mSpringStiffness; }
30     // Set parameters of a damper
31     void setMassCable(double massCable) { mMassCable = massCable; }
32     void setMassLoadedCable(double massLoadedCable) { mMassLoadedCable = massLoadedCable; }
33     void setWorkingLength(double workingLength) { mWorkingLength = workingLength; }
34     void setBouncerLength(double bouncerLength) { mBouncerLength = bouncerLength; }
35     void setSpringLength(double springLength) { mSpringLength = springLength; }
36     void setSpringStiffness(double springStiffness) { mSpringStiffness = springStiffness; }
37     // Compute characteristics of a damper
38     void computeSpring();
39
40 private:
42     double mMassCable;
44     double mMassLoadedCable;
46     double mWorkingLength;
48     double mBouncerLength;
50     double mSpringLength = 0.0;
52     double mSpringStiffness = 0.0;
53 };
54
55 }
56
57 #endif // DAMPER_H
```

5.25 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/databasecables.cpp File Reference

Definition of the DataBaseCables class.

```
#include <QFile>
#include <QTextStream>
#include "databasecables.h"
```

5.25.1 Detailed Description

Definition of the DataBaseCables class.

Author

Pavel Lakiza

Date

July 2022

5.26 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/databasecables.h File Reference

Declaration of the DataBaseCables class.

```
#include <QString>
#include <unordered_map>
```

Classes

- struct RSE::Core::Cable

  Mechanical properties of a cable.
- class RSE::Core::DataBaseCables

  Aggregate data of cables.

5.26.1 Detailed Description

Declaration of the DataBaseCables class.

Author

Pavel Lakiza

Date

July 2022

5.27 databasecables.h

Go to the documentation of this file.

```
1
8 #ifndef DATACABLES_H
9 #define DATACABLES_H
10
11 #include <QString>
12 #include <unordered_map>
13
14 namespace RSE::Core
15 {
16
18 struct Cable
19 {
21     std::string name;
23     double bendingStiffness;
25     double torsionalStiffness;
27     double massPerLength;
29     double youngsModulus;
31     double area;
32 };
33
35 class DataBaseCables
36 {
37 public:
38     DataBaseCables(QString const& directory, QString const& fileName);
39     ~DataBaseCables() = default;
40     std::vector<std::string> names() const;
41     Cable const& getItem(std::string const& name) const { return mData.at(name); }
42
43 private:
44     bool readDataBase(QString const& pathFile);
45
46 private:
47     std::unordered_map<std::string, Cable> mData;
48 };
49
50 }
51
52 #endif // DATACABLES_H
```

5.28 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/fileutilities.cpp File Reference

Definition of utilites targeted to working with files.

```
#include <QDebug>
#include <QString>
#include <QFile>
#include <QDir>
#include <QPair>
#include "fileutilities.h"
```

5.28.1 Detailed Description

Definition of utilites targeted to working with files.

Author

Pavel Lakiza

Date

July 2022

5.29 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/fileutilities.h File Reference

Declaration of utilities targeted to working with files.

```
#include <QSharedPointer>
#include "abstractdataobject.h"
```

Functions

- QPair< Core::AbstractDataObject::ObjectType, QSharedPointer< QFile > > **RSE::Utilities::File::getDataObjectFile** (QString const &path, QString const &fileName)

  Retrieve a pair consisted of a data object file and its type.
- QString **RSE::Utilities::File::loadFileContent** (QString const &path)

  Load all the content of a file.

5.29.1 Detailed Description

Declaration of utilities targeted to working with files.

Author

Pavel Lakiza

Date

July 2022

5.30 fileutilities.h

Go to the documentation of this file.

```
1
8 #ifndef FILEUTILITIES_H
9 #define FILEUTILITIES_H
10
11 #include <QSharedPointer>
12 #include "abstractdataobject.h"
13
14 class QFile;
15 class QString;
16
17 namespace RSE
18 {
19
20 namespace Utilities
21 {
22
23 namespace File
24 {
25
26 QPair<Core::AbstractDataObject::ObjectType, QSharedPointer<QFile>> getDataObjectFile(QString const& path,
      QString const& fileName);
27 QString loadFileContent(QString const& path);
28
29 }
30
31 }
32
33 }
34
35 #endif // FILEUTILITIES_H
```

5.31 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/io.cpp File Reference

Definition of the IO class.

```
#include <QFile>
#include <QFileInfo>
#include <QDir>
#include "io.h"
#include "project.h"
```

5.31.1 Detailed Description

Definition of the IO class.

Author

Pavel Lakiza

Date

July 2022

5.32 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/io.h File Reference

Declaration of the IO class.

```
#include <QString>
#include <QPair>
#include "solutionoptions.h"
```

Classes

- class RSE::Core::IO

  Class to save the project and solution data.

Typedefs

- using **RSE::Core::IOPair** = QPair< Project *, RSE::Solution::SolutionOptions * >

5.32.1 Detailed Description

Declaration of the IO class.

Author

Pavel Lakiza

Date

July 2022

5.33 io.h

Go to the documentation of this file.

```
1
8 #ifndef IO_H
9 #define IO_H
10
11 #include <QString>
12 #include <QPair>
13 #include "solutionoptions.h"
14
15 namespace RSE
16 {
17
18 namespace Core
19 {
20
21 class Project;
22 class DataBaseCables;
23
24 using IOPair = QPair<Project*, RSE::Solution::SolutionOptions*>;
25
27 class IO
28 {
29 public:
30     IO(QString const& lastPath);
31     ~IO() = default;
32     QString const& lastPath() const { return mLastPath; }
33     QString const& extension() const { return mkProjectExtension; }
34     void saveAs(QString const& pathFile, Project& project, Solution::SolutionOptions& options);
35     IOPair open(QString const& pathFile, DataBaseCables const& dataBaseCables);
36
37 private:
38     const QString mkProjectExtension = ".rse";
39     QString mLastPath;
40 };
41
42 }
43
44 }
45
46 #endif // IO_H
```

5.34 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/project.cpp File Reference

Definition of the Project class.

```
#include <QFile>
#include <QLocale>
#include "project.h"
#include "scalardataobject.h"
#include "vectordataobject.h"
#include "fileutilities.h"
#include "solutionoptions.h"
```

Functions

- void **clearDataObjects** (DataObjects &dataObjects)

  Helper function to clear a container consisted of pointers to data objects.
- QStringList **readAllLines** (QString const &path, QString const &fileName)

  Read all the lines from a file.
- void **replaceStringEntry** (QString &string, int numSkipEntries, QString subString)

  Replace a substring after specified number of skips.
- void **writeAllLines** (QStringList const &lines, QString const &path, QString const &fileName)

  Write all the lines to a file.

5.34.1 Detailed Description

Definition of the Project class.

Author

Pavel Lakiza

Date

July 2022

5.35 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/project.h File Reference

Declaration of the Project class.

```
#include <QString>
#include "abstractdataobject.h"
#include "damper.h"
#include "rodsystem.h"
#include "support.h"
#include "databasecables.h"
```

Classes

- class RSE::Core::Project

Typedefs

- using **RSE::Core::DataObjects** = std::vector< AbstractDataObject * >

5.35.1 Detailed Description

Declaration of the Project class.

Author

Pavel Lakiza

Date

July 2022

5.36 project.h

Go to the documentation of this file.

```
1
8 #ifndef PROJECT_H
9 #define PROJECT_H
10
11 #include <QString>
12 #include "abstractdataobject.h"
13 #include "damper.h"
14 #include "rodsystem.h"
15 #include "support.h"
16 #include "databasecables.h"
17
18 namespace RSE
19 {
20
21 namespace Solution
22 {
23 class SolutionOptions;
24 }
25
26 namespace Core
27 {
28 class ScalarDataObject;
29 class VectorDataObject;
30
31 using DataObjects = std::vector<AbstractDataObject*>;
32
33 class Project
34 {
35 public:
36     Project(QString const& name, DataBaseCables dataBaseCables, Damper damper, RodSystem rodSystem,
      Support support);
37     ~Project();
38     QString const& name() const { return mName; }
39     void setName(QString const& name) { mName = name; }
40     Damper& damper() { return mDamper; }
41     RodSystem& rodSystem() { return mRodSystem; }
42     Support& support() { return mSupport; }
43     DataBaseCables const& dataBaseCables() const { return mDataBaseCables; }
44     // IO
45     void readTemplateData(QString const& path);
46     void writeCalcData(QString const& path, Solution::SolutionOptions const& options);
47
48 private:
49     AbstractDataObject* addDataObject(AbstractDataObject::ObjectType type);
50     void importDataObjects(QString const& path, QString const& fileName);
51     void readProjectID(QString const& path);
52     // Modify data objects
53     void modifyScalarDataObjects();
54     void modifyVectorDataObjects(Spans const& spans);
55     // IO
56     void writeDataObjects(DataObjects const& dataObjects, QString const& path, QString const& fileName);
57     void writeRods(QString const& path, QString const& fileName);
58     void writeProgram(QString const& path, QString const& fileName, int numRods, int numCalcModes);
59
60 private:
62     QString mName;
64     Damper mDamper;
66     RodSystem mRodSystem;
68     Support mSupport;
```

```
70     DataBaseCables mDataBaseCables;
72     DataObjects mScalarDataObjects;
73     DataObjects mVectorDataObjects;
75     int mProjectID;
77     QStringList mRods;
79     QStringList mProgram;
81     static const QString skProjectExtension;
82 };
83
84 }
85
86 }
87
88 #endif // PROJECT_H
```

5.37 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/rodsystem.cpp File Reference

Definition of the RodSystem class.

```
#include <functional>
#include <stdlib.h>
#include <stdio.h>
#include <gsl/gsl_multiroots.h>
#include "rodsystem.h"
#include "constants.h"
#include "databasecables.h"
```

Typedefs

- using **IntegralFun** = std::function< double(double)>

Functions

- double **integrate** (IntegralFun const &f, double const &a, double const &b, int const &n)

  Compute integral using the MidPoint rule.
- double **x1** (double u, double u0, double uL)
- double **x2** (double u, double u0, double uL)
- double **Q1** (double u0, double uL)
- double **Q2** (double u, double u0, double uL)
- double **Nf** (double u, double u0, double uL)
- double **LL** (double L, double u0, double uL, RodSystemParameters const *pParameters)
- double **projForce** (double u0, double uL, double L, RodSystemParameters const *pParameters)
- int **equations** (const gsl_vector *pState, void *pVoidParameters, gsl_vector *pFun)

  System of equations.

5.37.1 Detailed Description

Definition of the RodSystem class.

Author

Pavel Lakiza

Date

July 2022

5.38 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/rodsystem.h File Reference

Declaration of the RodSystem class.

```
#include <QString>
#include <vector>
#include <gsl/gsl_vector.h>
```

Classes

- struct RSE::Core::Spans

  Computed parameters of spans.
- struct RSE::Core::RodSystemParameters

  Parameters of a rod system.
- class RSE::Core::RodSystem

5.38.1 Detailed Description

Declaration of the RodSystem class.

Author

Pavel Lakiza

Date

July 2022

5.39 rodsystem.h

Go to the documentation of this file.

```
1
8 #ifndef RODSYSTEM_H
9 #define RODSYSTEM_H
10
11 #include <QString>
12 #include <vector>
13 #include <gsl/gsl_vector.h>
14
15 namespace RSE::Core
16 {
17
18 struct Cable;
19
21 struct Spans
22 {
23     Spans(int numRods) : u0(numRods), uL(numRods), L(numRods) { }
24
26     std::vector<double> u0;
28     std::vector<double> uL;
30     std::vector<double> L;
32     double projectedForce;
33 };
34
36 struct RodSystemParameters
37 {
```

```
39      std::vector<double> distances;
41      double massPerLength;
43      double youngsModulus;
45      double area;
47      double force;
49      int numRods = 0;
50  };
51
52  class RodSystem
53  {
54  public:
55      RodSystem(std::vector<double> distances, Cable const& cable, double force);
56      // Get parameters of a system
57      std::vector<double> const& distances() const { return mParameters.distances; }
58      std::string const& nameCable() const { return mNameCable; }
59      double force() const { return mParameters.force; }
60      int numRods() const { return mParameters.numRods; }
61      double massPerLength() const { return mParameters.massPerLength; }
62      // Set parameters of a system
63      void setDistances(std::vector<double> const& distances);
64      void setCable(Cable const& cable);
65      void setForce(double force) { mParameters.force = force; };
66      // Compute parameters of spans
67      Spans computeSpans();
68
69  private:
70      RodSystemParameters mParameters;
71      std::string mNameCable;
72  };
73
74  }
75
76  #endif // RODSYSTEM_H
```

5.40 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/scalardataobject.cpp File Reference

Implementation of the ScalarDataObject class.

```
#include "scalardataobject.h"
```

5.40.1 Detailed Description

Implementation of the ScalarDataObject class.

Author

Pavel Lakiza

Date

July 2022

5.41 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/scalardataobject.h File Reference

Declaration of the ScalarDataObject class.

```
#include "abstractdataobject.h"
```

Classes

- class RSE::Core::ScalarDataObject

  Scalar data object.

5.41.1 Detailed Description

Declaration of the ScalarDataObject class.

Author

Pavel Lakiza

Date

July 2022

5.42 scalardataobject.h

Go to the documentation of this file.

```
1
8 #ifndef SCALARDATAOBJECT_H
9 #define SCALARDATAOBJECT_H
10
11 #include "abstractdataobject.h"
12
13 namespace RSE::Core
14 {
15
17 class ScalarDataObject : public AbstractDataObject
18 {
19 public:
20     ScalarDataObject(QString const& name);
21     ~ScalarDataObject();
22     AbstractDataObject* clone() const override;
23     DataItemType& addItem(DataValueType key) override;
24     static quint32 numberInstances() { return smNumInstances; }
25     virtual void import(QTextStream& stream) override;
26 private:
27     static quint32 smNumInstances;
28 };
29
30 }
31
32 #endif // SCALARDATAOBJECT_H
```

5.43 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/solutionmanager.cpp File Reference

Definition of the SolutionManager class.

```
#include <QFileInfo>
#include <QDir>
#include "solutionoptions.h"
#include "solutionmanager.h"
```

5.43.1 Detailed Description

Definition of the SolutionManager class.

Author

Pavel Lakiza

Date

July 2022

5.44 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/solutionmanager.h File Reference

Declaration of the SolutionManager class.

```
#include <QString>
#include <QProcess>
#include <QObject>
#include <QTextStream>
#include "project.h"
```

Classes

- class RSE::Solution::SolutionManager

  Class to control the solution process.

5.44.1 Detailed Description

Declaration of the SolutionManager class.

Author

Pavel Lakiza

Date

July 2022

5.45 solutionmanager.h

Go to the documentation of this file.

```
1
8 #ifndef SOLUTIONMANAGER_H
9 #define SOLUTIONMANAGER_H
10
11 #include <QString>
12 #include <QProcess>
13 #include <QObject>
14 #include <QTextStream>
15 #include "project.h"
16
17 namespace RSE::Solution
18 {
19
20 class SolutionOptions;
21
23 class SolutionManager : public QObject
24 {
25     Q_OBJECT
26
27 public:
28     SolutionManager(QString const& rootPath, QString const& relativeInputPath, QString const&
      relativeOutputPath);
29     ~SolutionManager();
30     void solveRodSystem(Core::Project& project, SolutionOptions const& options);
31     void solveOptimization(Core::Project& project, SolutionOptions const& options);
32     void runVisualizer();
33
34 signals:
35     void outputSent(QByteArray);
36     void rodSystemSolved();
37     void optimizationSolved();
38     void optimizationStepPerformed();
39
40 public slots:
41     void stopSolution();
42
43 private:
44     void processRodSystemStream();
45     void processOptimizationStream();
46     void runParserProcess();
47     void writeOptimizationInput(QString const& pathFile, int numDampers, SolutionOptions const& options);
48     int getRodSystemStatus();
49
50 private:
51     QString mRootPath;
52     QString mInputPath;
53     QString mOutputPath;
54     QProcess* mpRodSystemSolver = nullptr;
55     QProcess* mpOptimizationSolver = nullptr;
56 };
57
58 }
59
60
61
62 #endif // SOLUTIONMANAGER_H
```

5.46 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/solutionoptions.cpp File Reference

Definition of the SolutionOptions class.

```
#include "solutionoptions.h"
```

5.46.1 Detailed Description

Definition of the SolutionOptions class.

Author

Pavel Lakiza

Date

July 2022

5.47 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/solutionoptions.h File Reference

Declaration of the SolutionOptions class.

Classes

- class RSE::Solution::SolutionOptions

5.47.1 Detailed Description

Declaration of the SolutionOptions class.

Author

Pavel Lakiza

Date

July 2022

5.48 solutionoptions.h

Go to the documentation of this file.

```
1
8 #ifndef SOLUTIONOPTIONS_H
9 #define SOLUTIONOPTIONS_H
10
11 namespace RSE
12 {
13
14 namespace Solution
15 {
16
17 class SolutionOptions
18 {
19 public:
20     SolutionOptions() = default;
21     SolutionOptions(int numCalcModes, int numDampModes, int stepModes, double tolTrunc);
22     ~SolutionOptions() = default;
23     // Get parameters
24     int numCalcModes() const { return mNumCalcModes; }
25     int numDampModes() const { return mNumDampModes; }
26     int stepModes() const { return mStepModes; }
27     double tolTrunc() const { return mTolTrunc; }
28     // Set parameters
29     void setNumCalcModes(int numCalcModes) { mNumCalcModes = numCalcModes; }
30     void setNumDampModes(int numDampModes) { mNumDampModes = numDampModes; }
31     void setStepModes(int stepModes) { mStepModes = stepModes; }
```

```
32     void setTolTrunc(double tolTrunc) { mTolTrunc = tolTrunc; }
33
34 private:
36     int mNumCalcModes;
38     int mNumDampModes;
40     int mStepModes;
42     double mTolTrunc;
43 };
44
45 }
46
47 }
48
49
50 #endif // SOLUTIONOPTIONS_H
```

5.49 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/support.cpp File Reference

Definition of the Support class.

```
#include "support.h"
```

5.49.1 Detailed Description

Definition of the Support class.

Author

Pavel Lakiza

Date

July 2022

5.50 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/support.h File Reference

Declaration of the Support class.

Classes

- class RSE::Core::Support

  Class to aggregate data of supports.

5.50.1 Detailed Description

Declaration of the Support class.

Author

Pavel Lakiza

Date

July 2022

5.51 support.h

Go to the documentation of this file.

```
1
8 #ifndef SUPPORT_H
9 #define SUPPORT_H
10
11 namespace RSE::Core
12 {
13
15 class Support
16 {
17 public:
18     Support(double longitudinalStiffness, double verticalStiffness);
19     ~Support() = default;
20     // Get characteristics
21     double longitudinalStiffness() const { return mLongitudinalStiffness; }
22     double verticalStiffness() const { return mVerticalStiffness; }
23     // Set characteristics
24     void setLongitudinalStiffness(double longitudinalStiffness) { mLongitudinalStiffness =
       longitudinalStiffness; }
25     void setVerticalStiffness(double verticalStiffness) { mVerticalStiffness = verticalStiffness; }
26
27 private:
29     double mLongitudinalStiffness;
31     double mVerticalStiffness;
32 };
33
34 }
35
36 #endif // SUPPORT_H
```

5.52 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/core/vectordataobject.cpp File Reference

Implementation of the VectorDataObject class.

```
#include "vectordataobject.h"
```

Variables

- const IndexType **skNumElements** = 3

5.52.1 Detailed Description

Implementation of the VectorDataObject class.

Author

Pavel Lakiza

Date

July 2022

5.53 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/core/vectordataobject.h File Reference

Declaration of the VectorDataObject class.

```
#include "abstractdataobject.h"
```

Classes

- class RSE::Core::VectorDataObject

  Vector data object.

5.53.1 Detailed Description

Declaration of the VectorDataObject class.

Author

Pavel Lakiza

Date

July 2022

5.54 vectordataobject.h

Go to the documentation of this file.

```
1
8 #ifndef VECTORDATAOBJECT_H
9 #define VECTORDATAOBJECT_H
10
11 #include "abstractdataobject.h"
12
13 namespace RSE::Core
14 {
15
17 class VectorDataObject : public AbstractDataObject
18 {
19 public:
20     VectorDataObject(QString const& name);
21     ~VectorDataObject();
22     AbstractDataObject* clone() const override;
23     DataItemType& addItem(DataValueType key) override;
24     static quint32 numberInstances() { return smNumInstances; }
25     virtual void import(QTextStream& stream) override;
26
27 private:
28     static quint32 smNumInstances;
29 };
30
31 }
32
33 #endif // VECTORDATAOBJECT_H
```

5.55 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/framecollection.h File Reference

Collection of the data associated with the specified frame.

```
#include "frameobject.h"
```

Classes

- struct KLP::EnergyFrame

  Energy quantities associated with a frame.
- struct KLP::StateFrame

  Kinematic and dynamic quantities associated with a frame.
- struct KLP::FrameCollection

  Set of all quantities belonged to a frame.

Typedefs

- using **KLP::FloatFrameObject** = FrameObject< float >

Variables

- const int **KLP::kNumDirections** = 3

5.55.1 Detailed Description

Collection of the data associated with the specified frame.

Author

Pavel Lakiza

Date

July 2022

5.56 framecollection.h

Go to the documentation of this file.

```
1
9 #ifndef FRAMECOLLECTION_H
10 #define FRAMECOLLECTION_H
11
12 #include "frameobject.h"
13
14 namespace KLP
15 {
16
17 const int kNumDirections = 3;
18
19 using FloatFrameObject = FrameObject<float>;
20
22 struct EnergyFrame
23 {
24     FloatFrameObject kinetic;
25     FloatFrameObject potential;
26     FloatFrameObject full;
27 };
28
30 struct StateFrame
31 {
32     FloatFrameObject displacements[kNumDirections];
33     FloatFrameObject rotations[kNumDirections];
34     FloatFrameObject forces[kNumDirections];
35     FloatFrameObject moments[kNumDirections];
36 };
37
39 struct FrameCollection
40 {
42     int numRods;
44     FloatFrameObject parameter;
46     FloatFrameObject naturalLength;
47     FloatFrameObject accumulatedNaturalLength;
49     FloatFrameObject coordinates[kNumDirections];
51     StateFrame state;
53     StateFrame projectedState;
55     StateFrame firstDerivativeState;
57     StateFrame secondDerivativeState;
59     StateFrame errorState;
61     FloatFrameObject strain;
63     std::vector<StateFrame> modalStates;
65     FloatFrameObject frequencies;
67     EnergyFrame energy;
68 };
69
70 }
71
72 #endif // FRAMECOLLECTION_H
```

5.57 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobject.cpp File Reference

Definition of the FrameObject class.

`#include "frameobject.h"`

5.57.1 Detailed Description

Definition of the FrameObject class.

Author

Pavel Lakiza

Date

July 2022

5.58 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobject.h File Reference

Declaration of the FrameObject class.

```
#include <QDebug>
#include "frameobjectiterator.h"
```

Classes

- class KLP::FrameObject< T >

Functions

- template<typename K >
  QDebug **KLP::operator**<< (QDebug stream, FrameObject< K > &frameObject)

5.58.1 Detailed Description

Declaration of the FrameObject class.

Author

Pavel Lakiza

Date

July 2022

5.59 frameobject.h

Go to the documentation of this file.

```
1
8 #ifndef FRAMEOBJECT_H
9 #define FRAMEOBJECT_H
10
11 #include <QDebug>
12 #include "frameobjectiterator.h"
13
14 namespace KLP
15 {
16
17 template <typename T>
18 class FrameObject
19 {
20 public:
21     using iterator = FrameObjectIterator<T>;
22
23 public:
24     FrameObject(T const* pData = nullptr, T normFactor = 1.0, qint64 size = 0, qint64 step = 1);
25     ~FrameObject() = default;
26     bool isEmpty() const { return !mpData; }
27     qint64 size() const { return mSize; }
28     iterator begin() { return iterator(&mpData[0], mNormFactor, mStep); }
29     iterator end() { return iterator(&mpData[mSize], mNormFactor, mStep); }
30     iterator operator[](int index) { return begin() + index; }
```

```
31     template<typename K> friend QDebug operator«(QDebug stream, FrameObject<K>& frameObject);
32
33 private:
34     T const* mpData;
35     T mNormFactor;
36     qint64 mSize;
37     qint64 mStep;
38 };
39
40 template<typename K>
41 inline QDebug operator«(QDebug stream, FrameObject<K>& frameObject)
42 {
43     stream = stream.noquote();
44     for (auto it = frameObject.begin(); it != frameObject.end(); ++it)
45         stream « QString::number(*it) « Qt::endl;
46     return stream;
47 }
48
49 }
50
51 #endif // FRAMEOBJECT_H
```

5.60 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobjectiterator.cpp File Reference

Definition of the FrameObjectIterator class.

```
#include "frameobjectiterator.h"
```

5.60.1 Detailed Description

Definition of the FrameObjectIterator class.

Author

Pavel Lakiza

Date

July 2022

5.61 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/frameobjectiterator.h File Reference

Declaration of the FrameObjectIterator class.

```
#include <QtGlobal>
```

Classes

- class KLP::FrameObjectIterator< T >

  Class to iterate through data of a record.

5.61.1 Detailed Description

Declaration of the FrameObjectIterator class.

Author

Pavel Lakiza

Date

July 2022

5.62 frameobjectiterator.h

Go to the documentation of this file.

```
1
8 #ifndef FRAMEOBJECTITERATOR_H
9 #define FRAMEOBJECTITERATOR_H
10
11 #include <QtGlobal>
12
13 namespace KLP
14 {
15
17 template <typename T>
18 class FrameObjectIterator
19 {
20 public:
21     using self_type         = FrameObjectIterator<T>;
22     using iterator_category = std::random_access_iterator_tag;
23     using difference_type   = std::ptrdiff_t;
24     using value_type        = T;
25     using pointer           = T const*;
26     using reference         = T const&;
27
28 public:
29     FrameObjectIterator(pointer pData, T normFactor, qint64 step);
30     // Access
31     value_type operator*() { return *mpData * mNormFactor; }
32     // Operators
33     self_type& operator++() { mpData += mStep; return *this; }
34     self_type operator++(int) { self_type temp = *this; ++(*this); return temp; }
35     self_type operator+(const difference_type& movement) { auto pOldData = mpData; mpData += movement *
       mStep; self_type temp = *this; mpData = pOldData; return temp; }
36     difference_type operator-(const FrameObjectIterator& another) const { return mpData - another.mpData;
       }
37     // Comparison
38     friend bool operator== (self_type const& first, self_type const& second) { return first.mpData ==
       second.mpData; };
39     friend bool operator!= (self_type const& first, self_type const& second) { return !(first == second);
       };
40
41 private:
42     pointer mpData;
43     T mNormFactor;
44     qint64 const mStep;
45 };
46
47 }
48
49 #endif // FRAMEOBJECTITERATOR_H
```

5.63 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/klp/index.h File Reference

Specification of a structure to index records.

```
#include <QtGlobal>
#include "types.h"
#include <vector>
```

Classes

- struct KLP::IndexData

  Data of each record.
- struct KLP::Index

  Structure to navigate through records.

5.63.1 Detailed Description

Specification of a structure to index records.

Author

Pavel Lakiza

Date

July 2022

5.64 index.h

Go to the documentation of this file.

```
1
8 #ifndef INDEX_H
9 #define INDEX_H
10
11 #include <QtGlobal>
12 #include "types.h"
13 #include <vector>
14
15 namespace KLP
16 {
17
19 struct IndexData
20 {
22     qint64 position = 0;
24     qint64 size = 0;
26     qint64 step = 1;
28     qint64 partSize = 0;
29 };
30
32 struct Index
33 {
35     Index() { data.resize(RecordType::MAX_RECORD); }
37     std::vector<IndexData> data;
39     quint64 recordShift = 0;
41     quint64 relativeDataShift = 0;
42 };
43
44 }
45
46 #endif // INDEX_H
```

5.65 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/klp/result.cpp File Reference

Definition of the Result class.

```
#include <QFile>
#include <QDateTime>
#include "result.h"
```

5.65.1 Detailed Description

Definition of the Result class.

Author

Pavel Lakiza

Date

July 2022

5.66 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/klp/result.h File Reference

Declaration of the Result class.

```
#include <QString>
#include "index.h"
#include "framecollection.h"
```

Classes

- struct KLP::ResultInfo
- class KLP::Result

  Class to aggregate all the records.

5.66.1 Detailed Description

Declaration of the Result class.

Author

Pavel Lakiza

Date

July 2022

5.67 result.h

Go to the documentation of this file.

```
1
8 #ifndef RESULT_H
9 #define RESULT_H
10
11 #include <QString>
12 #include "index.h"
13 #include "framecollection.h"
14
15 namespace KLP
16 {
17
18 struct ResultInfo
19 {
21     uint identifier;
23     QString creationDate;
25     qint64 numTotalRecords;
27     qint64 numTimeRecords;
28 };
29
31 class Result
32 {
33 public:
34     explicit Result(QString const& pathFile);
35     ~Result() = default;
36     bool isEmpty() const { return mContent.isEmpty(); }
37     std::vector<float> const& time() const { return mTime; }
38     QString const& pathFile() const { return mkPathFile; }
39     int numRods(qint64 iFrame) const;
40     ResultInfo info() const;
41     FloatFrameObject getFrameObject(qint64 iFrame, RecordType type, float normFactor = 1.0f, qint64 shift
       = 0) const;
42     FrameCollection getFrameCollection(qint64 iFrame) const;
43     void update();
44
45 private:
46     bool read();
47     void buildIndex();
48     void setStateFrameData(StateFrame& state, RecordType type, qint64 iFrame, qint64 iStartData,
       std::vector<float> const& normFactors) const;
49
50 private:
52     QString const mkPathFile;
54     QByteArray mContent;
56     std::vector<Index> mIndex;
58     qint64 mNumRecords;
60     std::vector<float> mTime;
62     char mNumBytesRod;
63 };
64
65 }
66
67 #endif // RESULT_H
```

5.68 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/klp/types.h File Reference

Specification of data types in a KLP file.

Enumerations

- enum KLP::RecordType {
  R = 2 , **Xi** = 3 , **S** = 4 , **SS** = 5 ,
  X1 = 6 , **X2** = 7 , **X3** = 8 , **U** = 9 ,
  Ut = 10 , **Utt** = 11 , **EPS** = 12 , **UI** = 13 ,
  BETA = 15 , **Qm** = 16 , **qm** = 17 , **AE** = 18 ,
  MF = 19 , **MV** = 20 , **ND** = 21 , **FM** = 22 ,
  ERR = 23 , **MASS** = 24 , **RMASS** = 25 , **IP** = 26 ,
  CSM = 27 , **CS** = 28 , **CSP** = 29 , **CSE** = 30 ,
  CSG = 31 , **FI** = 32 , **FM2** = 33 , **EM** = 34 ,
  EN = 35 , **MAX_RECORD** }

Types of records.

- enum KLP::NondimensionalType {
  Time = 0 , **Displacement** = 1 , **Force** = 2 , **Moment** = 3 ,
  DistributedForce = 7 , **DistributedMoment** = 8 , **Speed** = 9 , **Acceleration** = 10 ,
  MAX_NONDIM }

  Types of nondimensional coefficients.

5.68.1 Detailed Description

Specification of data types in a KLP file.

Author

Pavel Lakiza

Date

July 2022

5.69 types.h

Go to the documentation of this file.

```
1
8 #ifndef TYPES_H
9 #define TYPES_H
10
11 namespace KLP
12 {
13
15 enum RecordType
16 {
17     R      = 2,  // Rods
18     Xi     = 3,  // Parameter
19     S      = 4,  // Natural length
20     SS     = 5,  // Accumulated natural length
21     X1     = 6,  // Coordinate X1
22     X2     = 7,  // Coordinate X2
23     X3     = 8,  // Coordinate X3
24     U      = 9,  // State vector: [U1, U2, U3, w1, w2, w3, Q1, Q2, Q3, M1, M2, M3]
25     Ut     = 10, // First-order derivative of the state vector with respect to time
26     Utt    = 11, // Second-order derivative of the state vector with respect to time
27     EPS    = 12, // Tensile-compressive strain
28     Ul     = 13, // Projected state vector: [U1L, U2L, U3L, w1, w2, w3, Q1L, Q2L, Q3L, M1L, M2L, M3L]
29     BETA   = 15, // Rotation matrix
30     Qm     = 16, // Loads
31     qm     = 17, // Distributed loads
32     AE     = 18, // Aerodynamic
33     MF     = 19, // Eigenfrequencies
34     MV     = 20, // Eigenvectors
35     ND     = 21, // Nondimensional coefficients [use NondimensionalType to navigate]
36     FM     = 22, // Finite element model
37     ERR    = 23, // Computational errors of the state vector
38     MASS   = 24, // Total mass and the center of gravity
39     RMASS  = 25, // Masses of rods
40     IP     = 26, // Cross sections
41     CSM    = 27, // ?
42     CS     = 28, // ?
43     CSP    = 29, // ?
44     CSE    = 30, // ?
45     CSG    = 31, // ?
46     FI     = 32, // Finite element image: set of coordinates (X, Y, Z) to plot lines
47     FM2    = 33, // ?
48     EM     = 34, // Effective masses
49     EN     = 35, // Energy
50     MAX_RECORD
51 };
52
54 enum NondimensionalType
```

```
55 {
56     Time              = 0,
57     Displacement      = 1,
58     Force             = 2,
59     Moment            = 3,
60     DistributedForce  = 7,
61     DistributedMoment = 8,
62     Speed             = 9,
63     Acceleration      = 10,
64     MAX_NONDIM
65 };
66
67 }
68
69 #endif // TYPES_H
```

5.70 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/main/main.cpp File Reference

Startup.

```
#include <QFile>
#include <QApplication>
#include "central/mainwindow.h"
#include "viewers/caputilities.h"
```

Functions

- int **main** (int argc, char *argv[])
  Startup point.

5.70.1 Detailed Description

Startup.

Author

Pavel Lakiza

Date

July 2022

5.71 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/viewers/caputilities.cpp File Reference

Definition of utilites targeted to working with application data.

```
#include <QApplication>
#include <QFontDatabase>
#include <QScreen>
#include <QWidget>
#include "caputilities.h"
#include "fileutilities.h"
```

5.71.1 Detailed Description

Definition of utilites targeted to working with application data.

Author

Pavel Lakiza

Date

July 2022

5.72 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/viewers/apputilities.h File Reference

Declaration of utilities targeted to working with application data.

```
#include <QWidget>
```

Functions

- void **RSE::Utilities::App::setStyle** ()
  Assign style features to the application.
- void **RSE::Utilities::App::moveToCenter** (QWidget ∗pChildWidget, QWidget ∗pLeadingWidget=nullptr)
  Align the child widget to the center of the leading widget or, if not specified, to the screen center.

5.72.1 Detailed Description

Declaration of utilities targeted to working with application data.

Author

Pavel Lakiza

Date

July 2022

5.73 apputilities.h

Go to the documentation of this file.

```
1
8 #ifndef APPUTILITIES_H
9 #define APPUTILITIES_H
10
11 #include <QWidget>
12
13 namespace RSE
14 {
15
16 namespace Utilities
17 {
18
19 namespace App
20 {
21
22 void setStyle();
23 void moveToCenter(QWidget* pChildWidget, QWidget* pLeadingWidget = nullptr);
24
25 }
26
27 }
28
29 }
30
31 #endif // APPUTILITIES_H
```

5.74 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/viewers/convergenceviewer.cpp File Reference

Definition of the ConvergenceViewer class.

```
#include <QVBoxLayout>
#include "convergenceviewer.h"
```

5.74.1 Detailed Description

Definition of the ConvergenceViewer class.

Author

Pavel Lakiza

Date

July 2022

5.75 /home/qinterfly/Library/Projects/Current/RodSystem↩ Estimator/src/viewers/convergenceviewer.h File Reference

Declaration of the ConvergenceViewer class.

```
#include <QWidget>
#include "array.h"
#include "qcustomplot.h"
```

Classes

- class RSE::Viewers::ConvergenceViewer

  Class to represent convergence of viscosities.

5.75.1 Detailed Description

Declaration of the ConvergenceViewer class.

Author

Pavel Lakiza

Date

July 2022

5.76 convergenceviewer.h

Go to the documentation of this file.

```
1
8 #ifndef CONVERGENCEVIEWER_H
9 #define CONVERGENCEVIEWER_H
10
11 #include <QWidget>
12 #include "array.h"
13 #include "qcustomplot.h"
14
15 namespace RSE
16 {
17
18 namespace Viewers
19 {
20
22 class ConvergenceViewer : public QWidget
23 {
24 public:
25     ConvergenceViewer(QString const& pathFile, QWidget* pParent = nullptr);
26     ~ConvergenceViewer();
27     void plot();
28
29 private:
30     void initialize();
31     bool read();
32
33 private:
34     QString const mkPathFile;
35     QCustomPlot* mpFigure;
36     QStringList mAvailableColors;
37     QVector<QCPScatterStyle::ScatterShape> mAvailableShapes;
38     QVector<int> mCalcModes;
39     Core::Array<double> mDampingValues;
40 };
41
42 }
43
44 }
45
46 #endif // CONVERGENCEVIEWER_H
```

5.77 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/viewers/klpgraphviewer.cpp File Reference

Definition of the KLPGraphViewer class.

```
#include <QSettings>
#include <QTextEdit>
#include "qcustomplot.h"
#include "DockManager.h"
#include "DockWidget.h"
#include "DockAreaWidget.h"
#include "ads_globals.h"
#include "central/uiconstants.h"
#include "klp/result.h"
#include "apputilities.h"
#include "klpgraphviewer.h"
```

5.77.1 Detailed Description

Definition of the KLPGraphViewer class.

Author

Pavel Lakiza

Date

July 2022

5.78 /home/qinterfly/Library/Projects/Current/RodSystemEstimator/src/viewers/klpgraphviewer.h File Reference

Declaration of the KLPGraphViewer class.

```
#include <QDialog>
#include "qcustomplot.h"
```

Classes

- class RSE::Viewers::KLPGraphViewer

  Class to graphically represent content of KLP output files.

5.78.1 Detailed Description

Declaration of the KLPGraphViewer class.

Author

Pavel Lakiza

Date

July 2022

5.79 klpgraphviewer.h

Go to the documentation of this file.

```
1
8 #ifndef KLPGRAPHVIEWER_H
9 #define KLPGRAPHVIEWER_H
10
11 #include <QDialog>
12 #include "qcustomplot.h"
13
14 QT_BEGIN_NAMESPACE
15 class QSettings;
16 QT_END_NAMESPACE
17
18 namespace ads
19 {
20 class CDockManager;
21 class CDockWidget;
22 }
23
24 namespace KLP
25 {
26 class Result;
27 }
28
29 namespace RSE
30 {
31
32 namespace Viewers
33 {
34
36 class KLPGraphViewer : public QDialog
37 {
38     Q_OBJECT
39
40 public:
41     KLPGraphViewer(QString const& lastPath, QSettings& settings, QWidget* pParent = nullptr);
42     ~KLPGraphViewer();
43     // Deal with results
44     void openResultsDialog();
45     void openResults(QStringList const& locationFiles);
46
47 private:
48     // Content
49     void initialize();
50     void createContent();
51     ads::CDockWidget* createResultWidget();
52     ads::CDockWidget* createFigureWidget();
53     ads::CDockWidget* createConstructorWidget();
54     ads::CDockWidget* createPropertyWidget();
55     // Settings
56     void saveSettings();
57     void restoreSettings();
58     void closeEvent(QCloseEvent* pEvent) override;
59
60 private:
61     // GUI
62     QString mLastPath;
63     QSettings& mSettings;
64     ads::CDockManager* mpDockManager = nullptr;
65     QCustomPlot* mpFigure;
66     // Data
```

```
67     std::vector<KLP::Result> mResults;
68 };
69
70 }
71
72 }
73
74 #endif // KLPGRAPHVIEWER_H
```