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Chapter 1

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Chapter 2

Heidelberg Educational Numerics Library (HDNUM)

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This licence clones the one of the `libstdc++` library. For further implications of this library please see their [license page](#).

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2.2 Installation

There is no installation. Just include the header file `hdnum.hh` and that is it.

2.3 Building the documentation

In the `hdnum` top-level directory just run `doxygen`. This will build the Doxygen documentation into the directory `doc/html` or `doc/latex`, respectively.

2.4 History

- Version 0.11 Revision 1620
- Version 0.12 from November, 5 2009.
- Version 0.20 from April, 21 2011.
- Version 0.22 from May, 11 2011. (Add more methods and documentation.)
- Version 0.23 from June, 14 2011. (Do not pass by reference for element-wise operations!)
- Version 0.24 from September, 9 2011. (import methods to solve odes/pdes)
- Version 0.25 from October, 20 2013. (add exceptions in linear algebra)
- Version 0.26 from October, 24 2013. delete countingptr and arrays

2.5 Links

Chapter 3

TODO Liste HDNUM Entwicklung

3.1 Code

- In den Folien zum kleinen Programmierkurs, mathematische Funktionen nicht über den Header `cmath` einbinden. Stattdessen die `std::` Implementierung verwenden.

3.2 Dokumentation

Chapter 4

Class Index

4.1 Class List

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

LinearOscillatorProblem< T, N >	
Example class for a differential equation model	13
VanDerPolProblem< T, N >	14

Chapter 5

Class Documentation

5.1 LinearOscillatorProblem< T, N > Class Template Reference

Example class for a differential equation model.

Public Types

- typedef std::size_t [size_type](#)
export size_type
- typedef T [time_type](#)
export time_type
- typedef N [number_type](#)
export number_type

Public Member Functions

- [LinearOscillatorProblem](#) ()
constructor
- std::size_t [size](#) () const
return number of components for the model
- void [initialize](#) (T &t0, hdnum::Vector< N > &u) const
set initial state including time value
- void [f](#) (const T &t, const hdnum::Vector< N > &u, hdnum::Vector< N > &result) const
model evaluation
- void [f_x](#) (const T &t, const hdnum::Vector< N > &x, hdnum::DenseMatrix< N > &result) const
jacobian evaluation needed for implicit solvers

5.1.1 Detailed Description

```
template<class T, class N = T>
class LinearOscillatorProblem< T, N >
```

Example class for a differential equation model.

The model is

$$u_0'(t) = -u_1(t), t \geq t_0, u_0(t_0) = U_0 \quad u_1'(t) = u_0(t), t \geq t_0, u_1(t_0) = U_1$$

Template Parameters

T	a type representing time values
N	a type representing components of states and f-values

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

- linearoscillator.cc

5.2 VanDerPolProblem< T, N > Class Template Reference

Public Types

- typedef std::size_t [size_type](#)
export size_type
- typedef T [time_type](#)
export time_type
- typedef N [number_type](#)
export number_type

Public Member Functions

- [VanDerPolProblem](#) ()
constructor stores parameter lambda
- **VanDerPolProblem** (N eps_)
- std::size_t [size](#) () const
return number of componentes for the model
- void [initialize](#) (T &t0, Vector< N > &x0) const
set initial state including time value
- void [f](#) (const T &t, const Vector< N > &x, Vector< N > &result) const
model evaluation
- void [f_x](#) (const T &t, const Vector< N > &x, DenseMatrix< N > &result) const
model evaluation
- [size_type](#) [get_count](#) () const

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

- vanderpol.cc

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LinearOscillatorProblem< T, N >, [13](#)

VanDerPolProblem< T, N >, [14](#)