

OoD solver

1.0

Generated by Doxygen 1.8.12

Contents

1	Namespace Index	1
1.1	Packages	1
2	Class Index	3
2.1	Class List	3
3	File Index	5
3.1	File List	5
4	Namespace Documentation	7
4.1	pkg Namespace Reference	7
4.2	pkg.isdh Namespace Reference	7
4.3	pkg.isdh.component Namespace Reference	7
4.4	pkg.isdh.deformation_step Namespace Reference	7
4.4.1	Function Documentation	8
4.4.1.1	__eq__()	8
4.4.1.2	__ne__()	8
4.4.1.3	__repr__()	9
4.4.1.4	print()	9
4.4.2	Variable Documentation	9
4.4.2.1	transformation	9
4.5	pkg.isdh.example_main Namespace Reference	10
4.5.1	Variable Documentation	10
4.5.1.1	frames_per_mm	10
4.5.1.2	n	10

4.5.1.3	structure	10
4.6	pkg.isdh.isdh_helper Namespace Reference	11
4.7	pkg.read_xml Namespace Reference	11
4.7.1	Function Documentation	11
4.7.1.1	add_components()	11
4.7.1.2	add_nodes()	12
4.7.1.3	gap_name()	12
4.7.1.4	gaps_insertor()	12
4.7.1.5	init_firewall_and_barrier()	13
4.7.1.6	read_xml()	13
4.7.2	Variable Documentation	14
4.7.2.1	backNode	14
4.7.2.2	frontNode	14
4.7.2.3	gap	14
4.7.2.4	ignore_me	14
4.7.2.5	key	14
4.7.2.6	listNodes	14
4.7.2.7	lp_levels	15
4.7.2.8	name	15
4.7.2.9	next_nodes	15
4.7.2.10	node	15
4.7.2.11	nodes	15
4.7.2.12	rightLimit	16
4.8	pkg.structure_core Namespace Reference	16
4.9	pkg.structure_core.Component Namespace Reference	16
4.9.1	Variable Documentation	16
4.9.1.1	BLACK	16
4.9.1.2	BLUE	17
4.9.1.3	DARK_GREEN	17
4.9.1.4	GREEN	17

4.9.1.5	level	17
4.9.1.6	LIGHT_BLUE	17
4.9.1.7	logger	17
4.9.1.8	RED	17
4.9.1.9	WHITE	17
4.10	pkg.structure_core.CrossComponent Namespace Reference	18
4.10.1	Variable Documentation	18
4.10.1.1	BLACK	18
4.10.1.2	BLUE	18
4.10.1.3	DARK_GREEN	18
4.10.1.4	GREEN	18
4.10.1.5	logger	18
4.10.1.6	RED	19
4.10.1.7	WHITE	19
4.11	pkg.structure_core.Loadpath Namespace Reference	19
4.11.1	Function Documentation	19
4.11.1.1	valid_components()	19
4.12	pkg.structure_core.Node Namespace Reference	20
4.12.1	Variable Documentation	20
4.12.1.1	BLACK	20
4.12.1.2	DARK_GREEN	20
4.12.1.3	level	20
4.12.1.4	logger	20
4.12.1.5	RED	20
4.13	pkg.structure_core.Structure Namespace Reference	21
4.13.1	Variable Documentation	21
4.13.1.1	BLACK	21
4.13.1.2	BLUE	21
4.13.1.3	DEBUG	21
4.13.1.4	GREEN	21

4.13.1.5	RED	22
4.13.1.6	screen	22
4.13.1.7	size	22
4.13.1.8	STEPWISE	22
4.13.1.9	WHITE	22
4.14	pkg.tree_core Namespace Reference	22
4.15	pkg.tree_core.NodeTree Namespace Reference	22
4.16	pkg.tree_core.tree Namespace Reference	23
4.16.1	Variable Documentation	23
4.16.1.1	PRINT	23
4.17	pkg.write_xml Namespace Reference	23
4.17.1	Function Documentation	23
4.17.1.1	ask_for_new_connection()	23
4.17.1.2	ask_for_new_level()	23
4.17.1.3	ask_for_new_member()	24
4.17.1.4	create_component()	24
4.17.1.5	create_level()	24
4.17.1.6	new_xml()	24
4.17.1.7	prettyfy()	24
4.18	Visualization Namespace Reference	24
4.19	Visualization.BlenderObject Namespace Reference	25
4.19.1	Variable Documentation	25
4.19.1.1	meshElement	25
4.19.1.2	meshMass	25
4.19.1.3	meshText	25
4.20	Visualization.CreateVideo Namespace Reference	25
4.21	Visualization.initialization Namespace Reference	25
4.21.1	Function Documentation	26
4.21.1.1	initialize()	26
4.21.1.2	static_numberOfElement()	26

4.22 Visualization.Member Namespace Reference	26
4.23 Visualization.setCamera Namespace Reference	26
4.23.1 Function Documentation	27
4.23.1.1 setCamera()	27
4.24 Visualization.setColor Namespace Reference	27
4.24.1 Function Documentation	28
4.24.1.1 makeColor()	28
4.24.1.2 setColor()	28
4.24.2 Variable Documentation	28
4.24.2.1 black	28
4.24.2.2 blue	29
4.24.2.3 dark_gray	29
4.24.2.4 gray	29
4.24.2.5 green	29
4.24.2.6 red	29
4.24.2.7 white	29
4.25 Visualization.setFunction Namespace Reference	29
4.25.1 Function Documentation	30
4.25.1.1 color()	30
4.25.1.2 deformation()	30
4.25.1.3 elimination()	31
4.25.1.4 interpolation()	31
4.25.1.5 movement()	31
4.25.1.6 rotation()	32
4.26 Visualization.setLamp Namespace Reference	32
4.26.1 Function Documentation	33
4.26.1.1 setLamp()	33
4.27 Visualization.setRender Namespace Reference	33
4.27.1 Function Documentation	33
4.27.1.1 Parameters()	33

5	Class Documentation	35
5.1	Visualization.BlenderObject.BlenderObject Class Reference	35
5.1.1	Detailed Description	35
5.1.2	Constructor & Destructor Documentation	35
5.1.2.1	__init__()	35
5.1.3	Member Function Documentation	36
5.1.3.1	get_geometricalObject()	36
5.1.4	Member Data Documentation	36
5.1.4.1	color	36
5.1.4.2	dimension	36
5.1.4.3	location	37
5.1.4.4	name	37
5.1.4.5	obj	37
5.1.4.6	object	37
5.1.4.7	rotation	37
5.1.4.8	type	37
5.2	pkg.isdh.component.Component Class Reference	37
5.2.1	Detailed Description	38
5.2.2	Constructor & Destructor Documentation	38
5.2.2.1	__init__()	38
5.2.3	Member Function Documentation	38
5.2.3.1	__repr__()	38
5.2.4	Member Data Documentation	39
5.2.4.1	defo_length	39
5.2.4.2	lp_level1	39
5.2.4.3	lp_level2	39
5.2.4.4	mass	39
5.2.4.5	mass_position	39
5.2.4.6	name	39
5.2.4.7	x1	39

5.2.4.8	x2	40
5.3	pkg.structure_core.Component.Component Class Reference	40
5.3.1	Detailed Description	40
5.3.2	Constructor & Destructor Documentation	41
5.3.2.1	__init__()	41
5.3.3	Member Function Documentation	41
5.3.3.1	__repr__()	41
5.3.3.2	deformable_length()	41
5.3.3.3	draw()	42
5.3.3.4	length()	42
5.3.3.5	link_to_barrier()	42
5.3.3.6	link_to_firewall()	43
5.3.3.7	moves()	43
5.3.3.8	next_gap()	43
5.3.4	Member Data Documentation	44
5.3.4.1	connectedToBarrier	44
5.3.4.2	connectedToFirewall	44
5.3.4.3	isGap	44
5.3.4.4	leftNode	44
5.3.4.5	name	44
5.3.4.6	rightNode	44
5.3.4.7	rigidLength	44
5.4	Visualization.CreateVideo.CreateVideo Class Reference	45
5.4.1	Detailed Description	45
5.4.2	Constructor & Destructor Documentation	45
5.4.2.1	__init__()	45
5.5	pkg.structure_core.CrossComponent.CrossComponent Class Reference	46
5.5.1	Detailed Description	46
5.5.2	Constructor & Destructor Documentation	46
5.5.2.1	__init__()	46

5.5.3	Member Function Documentation	47
5.5.3.1	__repr__()	47
5.5.3.2	deformable_length()	47
5.5.3.3	draw()	47
5.5.3.4	is_valid()	48
5.5.3.5	left_deforms()	48
5.5.3.6	length()	48
5.5.3.7	link_to_barrier()	49
5.5.3.8	link_to_firewall()	49
5.5.3.9	right_deforms()	49
5.5.4	Member Data Documentation	50
5.5.4.1	breakable	50
5.5.4.2	broken	50
5.5.4.3	connectedToBarrier	50
5.5.4.4	connectedToFirewall	50
5.5.4.5	leftNode	50
5.5.4.6	name	50
5.5.4.7	rightNode	50
5.5.4.8	rigidLength	51
5.6	pkg.isdh.deformation_step.DeformationStep Class Reference	51
5.6.1	Detailed Description	51
5.6.2	Constructor & Destructor Documentation	51
5.6.2.1	__init__()	51
5.6.3	Member Data Documentation	51
5.6.3.1	amount	51
5.6.3.2	frame_begin	52
5.6.3.3	frame_end	52
5.6.3.4	transformation	52
5.7	Visualization.Member.generalMember Class Reference	52
5.7.1	Detailed Description	53

5.7.2	Constructor & Destructor Documentation	53
5.7.2.1	__init__()	53
5.7.3	Member Function Documentation	53
5.7.3.1	__repr__()	53
5.7.3.2	deform()	54
5.7.3.3	move()	54
5.7.4	Member Data Documentation	55
5.7.4.1	angle	55
5.7.4.2	deformPart	55
5.7.4.3	dL	55
5.7.4.4	dX	55
5.7.4.5	dY	55
5.7.4.6	elementSize	55
5.7.4.7	l1	56
5.7.4.8	l2	56
5.7.4.9	lNode	56
5.7.4.10	mass	56
5.7.4.11	mass_position	56
5.7.4.12	nonDeformPart	56
5.7.4.13	rDL	56
5.7.4.14	rL	56
5.7.4.15	rNode	57
5.7.4.16	rPM	57
5.7.4.17	rRL	57
5.7.4.18	sep	57
5.7.4.19	tag	57
5.7.4.20	totalLength	57
5.8	pkg.isdh.isdh_helper.IsdhHelper Class Reference	58
5.8.1	Detailed Description	58
5.8.2	Constructor & Destructor Documentation	58

5.8.2.1	<code>__init__()</code>	58
5.8.3	Member Function Documentation	58
5.8.3.1	<code>copy_ood()</code>	58
5.8.3.2	<code>init_ood()</code>	59
5.8.3.3	<code>register()</code>	59
5.8.3.4	<code>save()</code>	59
5.8.3.5	<code>save_defo_step()</code>	60
5.8.3.6	<code>save_ood()</code>	60
5.8.3.7	<code>unsave()</code>	60
5.8.3.8	<code>update_amount()</code>	61
5.8.4	Member Data Documentation	61
5.8.4.1	<code>amount</code>	61
5.8.4.2	<code>d_h</code>	61
5.8.4.3	<code>i_s</code>	61
5.8.4.4	<code>isdh_dict</code>	61
5.8.4.5	<code>ood</code>	62
5.9	<code>pkg.structure_core.Loadpath.Loadpath</code> Class Reference	62
5.9.1	Detailed Description	62
5.9.2	Constructor & Destructor Documentation	62
5.9.2.1	<code>__init__()</code>	62
5.9.3	Member Data Documentation	63
5.9.3.1	<code>level</code>	63
5.9.3.2	<code>listComponents</code>	63
5.9.3.3	<code>setNodes</code>	63
5.10	<code>pkg.structure_core.Node.Node</code> Class Reference	63
5.10.1	Detailed Description	64
5.10.2	Constructor & Destructor Documentation	64
5.10.2.1	<code>__init__()</code>	64
5.10.3	Member Function Documentation	64
5.10.3.1	<code>__eq__()</code>	64

5.10.3.2	<code>__hash__()</code>	64
5.10.3.3	<code>__repr__()</code>	64
5.10.3.4	<code>change_position()</code>	65
5.10.3.5	<code>draw()</code>	65
5.10.4	Member Data Documentation	65
5.10.4.1	<code>loadpathLevel</code>	65
5.10.4.2	<code>onBarrier</code>	65
5.10.4.3	<code>onFirewall</code>	66
5.10.4.4	<code>position</code>	66
5.10.4.5	<code>towardsBarrier</code>	66
5.10.4.6	<code>towardsFirewall</code>	66
5.11	<code>pkg.tree_core.NodeTree.NodeTree</code> Class Reference	66
5.11.1	Detailed Description	67
5.11.2	Constructor & Destructor Documentation	67
5.11.2.1	<code>__init__()</code>	67
5.11.3	Member Function Documentation	67
5.11.3.1	<code>__repr__()</code>	67
5.11.3.2	<code>add_child()</code>	68
5.11.3.3	<code>check_amount()</code>	68
5.11.3.4	<code>check_keep_deforming()</code>	68
5.11.3.5	<code>cross_components_amount()</code>	69
5.11.3.6	<code>d_print()</code>	69
5.11.3.7	<code>deform()</code>	70
5.11.3.8	<code>determine_amount()</code>	70
5.11.3.9	<code>next_children()</code>	70
5.11.3.10	<code>substitute_children()</code>	71
5.11.3.11	<code>undeform()</code>	71
5.11.4	Member Data Documentation	71
5.11.4.1	<code>amount</code>	71
5.11.4.2	<code>children</code>	71

5.11.4.3	deformingComps	72
5.11.4.4	deformingCrossComps	72
5.11.4.5	isValid	72
5.11.4.6	keep	72
5.11.4.7	movingComps	72
5.11.4.8	movingCrossComps	72
5.11.4.9	parent	72
5.11.4.10	stretchingCrossComps	72
5.11.4.11	structure	73
5.11.4.12	substitute	73
5.12	pkg.structure_core.Structure.Structure Class Reference	73
5.12.1	Detailed Description	73
5.12.2	Constructor & Destructor Documentation	74
5.12.2.1	__init__()	74
5.12.3	Member Function Documentation	74
5.12.3.1	draw()	74
5.12.3.2	get_deforming_components()	74
5.12.3.3	reset_connections_to_barrier_and_firewall()	75
5.12.3.4	task_one()	75
5.12.3.5	task_two()	76
5.12.4	Member Data Documentation	76
5.12.4.1	listCrossComponents	76
5.12.4.2	listGaps	76
5.12.4.3	listLoadpaths	76
5.13	pkg.tree_core.tree.Tree Class Reference	77
5.13.1	Detailed Description	77
5.13.2	Constructor & Destructor Documentation	77
5.13.2.1	__init__()	77
5.13.3	Member Function Documentation	78
5.13.3.1	__repr__()	78

5.13.3.2	add_children()	78
5.13.3.3	deform()	78
5.13.3.4	end()	79
5.13.3.5	go_down()	79
5.13.3.6	go_right()	79
5.13.3.7	go_up()	80
5.13.3.8	print()	80
5.13.3.9	surf()	80
5.13.3.10	undeform()	81
5.13.4	Member Data Documentation	81
5.13.4.1	activeNode	81
5.13.4.2	root	81
5.13.4.3	savers	82
5.13.4.4	structure	82
6	File Documentation	83
6.1	pkg/__init__.py File Reference	83
6.2	pkg/isdh/__init__.py File Reference	83
6.3	pkg/structure_core/__init__.py File Reference	83
6.4	pkg/tree_core/__init__.py File Reference	83
6.5	Visualization/__init__.py File Reference	83
6.6	pkg/isdh/component.py File Reference	84
6.7	pkg/structure_core/Component.py File Reference	84
6.8	pkg/isdh/deformation_step.py File Reference	84
6.9	pkg/isdh/example_main.py File Reference	85
6.10	pkg/isdh/isdh_helper.py File Reference	85
6.11	pkg/read_xml.py File Reference	85
6.12	pkg/structure_core/CrossComponent.py File Reference	86
6.13	pkg/structure_core/Loadpath.py File Reference	87
6.14	pkg/structure_core/Node.py File Reference	87
6.15	pkg/structure_core/Structure.py File Reference	87
6.16	pkg/tree_core/NodeTree.py File Reference	88
6.17	pkg/tree_core/tree.py File Reference	88
6.18	pkg/write_xml.py File Reference	88
6.19	Visualization/BlenderObject.py File Reference	89
6.20	Visualization/CreateVideo.py File Reference	89
6.21	Visualization/initialization.py File Reference	89
6.22	Visualization/Member.py File Reference	90
6.23	Visualization/setCamera.py File Reference	90
6.24	Visualization/setColor.py File Reference	90
6.25	Visualization/setFunction.py File Reference	91
6.26	Visualization/setLamp.py File Reference	91
6.27	Visualization/setRender.py File Reference	91

Chapter 1

Namespace Index

1.1 Packages

Here are the packages with brief descriptions (if available):

pkg	7
pkg.isdh	7
pkg.isdh.component	7
pkg.isdh.deformation_step	7
pkg.isdh.example_main	10
pkg.isdh.isdh_helper	11
pkg.read_xml	11
pkg.structure_core	16
pkg.structure_core.Component	16
pkg.structure_core.CrossComponent	18
pkg.structure_core.Loadpath	19
pkg.structure_core.Node	20
pkg.structure_core.Structure	21
pkg.tree_core	22
pkg.tree_core.NodeTree	22
pkg.tree_core.tree	23
pkg.write_xml	23
Visualization	24
Visualization.BlenderObject	25
Visualization.CreateVideo	25
Visualization.initialization	25
Visualization.Member	26
Visualization.setCamera	26
Visualization.setColor	27
Visualization.setFunction	29
Visualization.setLamp	32
Visualization.setRender	33

Chapter 2

Class Index

2.1 Class List

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

Visualization.BlenderObject.BlenderObject	35
pkg.isdh.component.Component	37
pkg.structure_core.Component.Component	40
Visualization.CreateVideo.CreateVideo	45
pkg.structure_core.CrossComponent.CrossComponent	46
pkg.isdh.deformation_step.DeformationStep	51
Visualization.Member.generalMember	52
pkg.isdh.isdh_helper.IsdhHelper	58
pkg.structure_core.Loadpath.Loadpath	62
pkg.structure_core.Node.Node	63
pkg.tree_core.NodeTree.NodeTree	66
pkg.structure_core.Structure.Structure	73
pkg.tree_core.tree.Tree	77

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

pkg/___init___py	83
pkg/read_xml.py	85
pkg/write_xml.py	88
pkg/isdh/___init___py	83
pkg/isdh/component.py	84
pkg/isdh/deformation_step.py	84
pkg/isdh/example_main.py	85
pkg/isdh/isdh_helper.py	85
pkg/structure_core/___init___py	83
pkg/structure_core/Component.py	84
pkg/structure_core/CrossComponent.py	86
pkg/structure_core/Loadpath.py	87
pkg/structure_core/Node.py	87
pkg/structure_core/Structure.py	87
pkg/tree_core/___init___py	83
pkg/tree_core/NodeTree.py	88
pkg/tree_core/tree.py	88
Visualization/___init___py	83
Visualization/BlenderObject.py	89
Visualization/CreateVideo.py	89
Visualization/initialization.py	89
Visualization/Member.py	90
Visualization/setCamera.py	90
Visualization/setColor.py	90
Visualization/setFunction.py	91
Visualization/setLamp.py	91
Visualization/setRender.py	91

Chapter 4

Namespace Documentation

4.1 pkg Namespace Reference

Namespaces

- [isdh](#)
- [read_xml](#)
- [structure_core](#)
- [tree_core](#)
- [write_xml](#)

4.2 pkg.isdh Namespace Reference

Namespaces

- [component](#)
- [deformation_step](#)
- [example_main](#)
- [isdh_helper](#)

4.3 pkg.isdh.component Namespace Reference

Classes

- class [Component](#)

4.4 pkg.isdh.deformation_step Namespace Reference

Classes

- class [DeformationStep](#)

Functions

- `def __repr__(self)`

LEGEND:

'd': the element deforms

'm': the element moves

'b': the element breaks

- `def __eq__(self, other)`
- `def __ne__(self, other)`
- `def print(self)`

Variables

- [transformation](#)

4.4.1 Function Documentation

4.4.1.1 `__eq__()`

```
def pkg.isdh.deformation_step.__eq__ (
    self,
    other )
```

Return `self == other`.

Args:
 other:
 DeformationStep object.

Returns:
 True or False.

Raises:
 NotImplementedError is raised, if other is not a DeformationStep object.

Definition at line 24 of file `deformation_step.py`.

4.4.1.2 `__ne__()`

```
def pkg.isdh.deformation_step.__ne__ (
    self,
    other )
```

Return `self != other`.

Args:
 other:
 DeformationStep object.

Returns:
 True or False.

Raises:
 NotImplementedError is raised, if other is not a DeformationStep object.

Definition at line 40 of file `deformation_step.py`.

4.4.1.3 `__repr__()`

```
def pkg.isdh.deformation_step.__repr__ (
    self )
```

LEGEND:

'd': the element deforms

'm': the element moves

'b': the element breaks

Return the string representation of the object.

Args:
 nothing is taken
Returns:
 string
Raises:
 nothing is raised

Definition at line 12 of file deformation_step.py.

4.4.1.4 `print()`

```
def pkg.isdh.deformation_step.print (
    self )
```

Print a detailed description of the object.

Args:
 nothing is taken.
Returns:
 nothing is returned.
Raises:
 nothing is raised.

Definition at line 57 of file deformation_step.py.

4.4.2 Variable Documentation

4.4.2.1 `transformation`

```
pkg.isdh.deformation_step.transformation
```

Definition at line 67 of file deformation_step.py.

4.5 pkg.isdh.example_main Namespace Reference

Variables

- `structure` = `s.read_xml('some_folder/my_xml_file.xml')`
- `int n = 0`
solve the structure
- `frames_per_mm`

4.5.1 Variable Documentation

4.5.1.1 frames_per_mm

`pkg.isdh.example_main.frames_per_mm`

Definition at line 49 of file `example_main.py`.

4.5.1.2 n

`int pkg.isdh.example_main.n = 0`

solve the structure

- `***** REMARK the isdh module works as an interface between the solver_module and the animation_module. No matter how structure.solve() works: the output is defined so that it can be used as an input for a.create_video()`
- `***** create the video`

Definition at line 48 of file `example_main.py`.

4.5.1.3 structure

`pkg.isdh.example_main.structure = s.read_xml('some_folder/my_xml_file.xml')`

- `***** REMARK the solver_module has to implement:`
- a function called `read_xml()` that takes an .xml file as input and outputs an object of a class
- a method of that class called `solve()` that doesn't take anything as input and outputs the 2 lists of isdh objects defined below
- `*****`

Definition at line 17 of file `example_main.py`.

4.6 pkg.isdh.isdh_helper Namespace Reference

Classes

- class [IsdhHelper](#)

4.7 pkg.read_xml Namespace Reference

Functions

- def [read_xml](#) (path)
- def [add_nodes](#) (root, struct)
- def [add_components](#) (root, struct)
- def [gaps_insertor](#) (structure)
- def [gap_name](#) (level)
- def [init_firewall_and_barrier](#) (structure)

Variables

- [node](#)
add gaps in front of the loadpath
- [frontNode](#)
- [gap](#) = Component. \
- [name](#) = [gap_name](#)(loadpath.level)
add gaps between components create a gap_name iterator (e.g.
- [listNodes](#) = list(loadpath.setNodes)
- [key](#)
- [nodes](#)
- [next_nodes](#)
- [ignore_me](#) = next([next_nodes](#))
- [list_lp_levels](#)
- [rightLimit](#)
- [backNode](#)

4.7.1 Function Documentation

4.7.1.1 add_components()

```
def pkg.read_xml.add_components (
    root,
    struct )
```

Add components to the structure, given the root of the tree to parse.

Every compoenent is added to the correct loadpath defined in struct.listLoadpaths. The loadpath must already contain the left and the right node of each component.

Args:

```
root:
    the root of the tree to parse given by the ElementTree.getroot()
    function.
struct:
    the structure_core.structure.Structure obj
```

Returns:

```
nothing is returned.
```

Raises:

```
nothing is raised.
```

Definition at line 85 of file read_xml.py.

4.7.1.2 add_nodes()

```
def pkg.read_xml.add_nodes (
    root,
    struct )
```

Add nodes to the structure, given the root of the tree to parse.

Every node is added to the correct loadpath defined in `struct.listLoadpaths`.

Args:

root:
the root of the tree to parse given by the `ElementTree.getroot()` function.
struct:
the `structure_core.structure.Structure` obj

Returns:

nothing is returned.

Raises:

nothing is raised.

Definition at line 36 of file `read_xml.py`.

4.7.1.3 gap_name()

```
def pkg.read_xml.gap_name (
    level )
```

Yields a string, to be used as a name for the next gap.

Args:

level:
an integer, the level of the loadpath to which the gap belongs.

Returns:

a string

Raises:

nothing is raised.

Definition at line 261 of file `read_xml.py`.

4.7.1.4 gaps_insertor()

```
def pkg.read_xml.gaps_insertor (
    structure )
```

Add gaps to the structure.

Every gap is added (as a component) to the correct loadpath defined in `struct.listLoadpaths`. The loadpath must already contain all the nodes and all the components.

Gaps are added where needed:

- in front of loadpaths that are not directly connected to the barrier
- between non-adjacent components
- behind loadpaths that are not directly connected to the firewall

```
|xx|      gap      o-----o      gap      o-----o      gap      |x|
```

barrier firewall

Args:
 struct:
 the structure_core.structure.Structure obj
Returns:
 nothing is returned.
Raises:
 nothing is raised.

Definition at line 158 of file read_xml.py.

4.7.1.5 init_firewall_and_barrier()

```
def pkg.read_xml.init_firewall_and_barrier (  
    structure )
```

Initialise the connections of components, cross components and nodes.

The attributes `.connectedToBarrier` and `.connectedToFirewall` of every `structure_core.Component` and `structure_core.CrossComponent` object are initialised.

The attributes `.onBarrier` and `.onFirewall` of every `structure_core.Node` object are initialised.

Args:
 structure:
 structure_core.structure.Structure object that groups components,
 cross components and nodes to initialise.
Returns:
 nothing is returned.
Raises:
 nothing is raised.

Definition at line 277 of file read_xml.py.

4.7.1.6 read_xml()

```
def pkg.read_xml.read_xml (  
    path )
```

Return a Structure object, based on the .xml at the given path.

Args:
 path:
 a string, that contains the path to the .xml file
Returns:
 an object of the class structure_core.structure.Structure.
Raises:
 nothing is raised.

Definition at line 9 of file read_xml.py.

4.7.2 Variable Documentation

4.7.2.1 backNode

`pkg.read_xml.backNode`

Initial value:

```
1 = Node.Node(rightLimit,
2               node.loadpathLevel)
```

Definition at line 248 of file read_xml.py.

4.7.2.2 frontNode

`pkg.read_xml.frontNode`

Initial value:

```
1 = Node.Node(leftLimit,
2               # position
               node.loadpathLevel)
```

Definition at line 193 of file read_xml.py.

4.7.2.3 gap

`pkg.read_xml.gap = Component. \`

Definition at line 196 of file read_xml.py.

4.7.2.4 ignore_me

`pkg.read_xml.ignore_me = next(next_nodes)`

Definition at line 214 of file read_xml.py.

4.7.2.5 key

`pkg.read_xml.key`

Definition at line 210 of file read_xml.py.

4.7.2.6 listNodes

`pkg.read_xml.listNodes = list(loadpath.setNodes)`

Definition at line 209 of file read_xml.py.

4.7.2.7 lp_levels

```
list pkg.read_xml.lp_levels
```

Initial value:

```
1 = [crossComp.rightNode.loadpathLevel
2     for crossComp in node.towardsFirewall]
```

Definition at line 241 of file read_xml.py.

4.7.2.8 name

```
pkg.read_xml.name = gap_name(loadpath.level)
```

add gaps between components create a gap_name iterator (e.g.

'gap-0-1', 'gap-0-2', ...)

Definition at line 207 of file read_xml.py.

4.7.2.9 next_nodes

```
pkg.read_xml.next_nodes
```

Definition at line 212 of file read_xml.py.

4.7.2.10 node

```
pkg.read_xml.node
```

Initial value:

```
1 = min((node
2         for node in loadpath.setNodes),
3         key = lambda node: node.position)
```

add gaps in front of the loadpath

add gaps behind the loadpath

Definition at line 189 of file read_xml.py.

4.7.2.11 nodes

```
pkg.read_xml.nodes
```

Definition at line 212 of file read_xml.py.

4.7.2.12 rightLimit

`pkg.read_xml.rightLimit`

Initial value:

```
1 = max(comp.rightNode.position
2         for lp in structure.listLoadpaths
3         if lp.level in lp_levels
4         for comp in lp.listComponents)
```

Definition at line 244 of file `read_xml.py`.

4.8 pkg.structure_core Namespace Reference

Namespaces

- [Component](#)
- [CrossComponent](#)
- [Loadpath](#)
- [Node](#)
- [Structure](#)

4.9 pkg.structure_core.Component Namespace Reference

Classes

- class [Component](#)

Variables

- [logger](#) = `logging.getLogger('component')`
- [level](#)
- tuple [BLACK](#) = (0, 0, 0)
- tuple [WHITE](#) = (255, 255, 255)
- tuple [RED](#) = (255, 0, 0)
- tuple [GREEN](#) = (0, 255, 0)
- tuple [BLUE](#) = (0, 0, 255)
- tuple [LIGHT_BLUE](#) = (102, 255, 255)
- tuple [DARK_GREEN](#) = (0, 100, 0)

4.9.1 Variable Documentation

4.9.1.1 BLACK

tuple `pkg.structure_core.Component.BLACK` = (0, 0, 0)

Definition at line 12 of file `Component.py`.

4.9.1.2 BLUE

```
tuple pkg.structure_core.Component.BLUE = ( 0, 0, 255)
```

Definition at line 16 of file Component.py.

4.9.1.3 DARK_GREEN

```
tuple pkg.structure_core.Component.DARK_GREEN = ( 0, 100, 0)
```

Definition at line 18 of file Component.py.

4.9.1.4 GREEN

```
tuple pkg.structure_core.Component.GREEN = ( 0, 255, 0)
```

Definition at line 15 of file Component.py.

4.9.1.5 level

```
pkg.structure_core.Component.level
```

Definition at line 4 of file Component.py.

4.9.1.6 LIGHT_BLUE

```
tuple pkg.structure_core.Component.LIGHT_BLUE = (102, 255, 255)
```

Definition at line 17 of file Component.py.

4.9.1.7 logger

```
pkg.structure_core.Component.logger = logging.getLogger('component')
```

Definition at line 3 of file Component.py.

4.9.1.8 RED

```
tuple pkg.structure_core.Component.RED = (255, 0, 0)
```

Definition at line 14 of file Component.py.

4.9.1.9 WHITE

```
tuple pkg.structure_core.Component.WHITE = (255, 255, 255)
```

Definition at line 13 of file Component.py.

4.10 pkg.structure_core.CrossComponent Namespace Reference

Classes

- class [CrossComponent](#)

Variables

- [logger](#) = logging.getLogger('CrossComponentLogger')
- tuple [BLACK](#) = (0, 0, 0)
- tuple [WHITE](#) = (255, 255, 255)
- tuple [RED](#) = (255, 0, 0)
- tuple [GREEN](#) = (0, 255, 0)
- tuple [BLUE](#) = (0, 0, 255)
- tuple [DARK_GREEN](#) = (0, 100, 0)

4.10.1 Variable Documentation

4.10.1.1 BLACK

```
tuple pkg.structure_core.CrossComponent.BLACK = ( 0, 0, 0)
```

Definition at line 10 of file CrossComponent.py.

4.10.1.2 BLUE

```
tuple pkg.structure_core.CrossComponent.BLUE = ( 0, 0, 255)
```

Definition at line 14 of file CrossComponent.py.

4.10.1.3 DARK_GREEN

```
tuple pkg.structure_core.CrossComponent.DARK_GREEN = ( 0, 100, 0)
```

Definition at line 15 of file CrossComponent.py.

4.10.1.4 GREEN

```
tuple pkg.structure_core.CrossComponent.GREEN = ( 0, 255, 0)
```

Definition at line 13 of file CrossComponent.py.

4.10.1.5 logger

```
pkg.structure_core.CrossComponent.logger = logging.getLogger('CrossComponentLogger')
```

Definition at line 2 of file CrossComponent.py.

4.10.1.6 RED

```
tuple pkg.structure_core.CrossComponent.RED = (255, 0, 0)
```

Definition at line 12 of file CrossComponent.py.

4.10.1.7 WHITE

```
tuple pkg.structure_core.CrossComponent.WHITE = (255, 255, 255)
```

Definition at line 11 of file CrossComponent.py.

4.11 pkg.structure_core.Loadpath Namespace Reference

Classes

- class [Loadpath](#)

Functions

- def [valid_components](#) (self)
*def add_member(self, component): *"""Function adds components to the list of components """* self.list←
Components.append(component)*

4.11.1 Function Documentation

4.11.1.1 valid_components()

```
def pkg.structure_core.Loadpath.valid_components (
    self )
```

```
def add_member(self, component): """Function adds components to the list of components """ self.list←  
Components.append(component)
```

Returns a list with the current components allowed to deform.

Args:
 nothing is taken
Returns:
 nothing is returned
Raises:
 nothing is raised.

Definition at line 26 of file Loadpath.py.

4.12 pkg.structure_core.Node Namespace Reference

Classes

- class [Node](#)

Variables

- tuple [BLACK](#) = (0, 0, 0)
- tuple [RED](#) = (255, 0, 0)
- tuple [DARK_GREEN](#) = (0, 100, 0)
- [logger](#) = logging.getLogger('node')
- [level](#)

4.12.1 Variable Documentation

4.12.1.1 BLACK

```
tuple pkg.structure_core.Node.BLACK = ( 0, 0, 0)
```

Definition at line 7 of file Node.py.

4.12.1.2 DARK_GREEN

```
tuple pkg.structure_core.Node.DARK_GREEN = ( 0, 100, 0)
```

Definition at line 9 of file Node.py.

4.12.1.3 level

```
pkg.structure_core.Node.level
```

Definition at line 12 of file Node.py.

4.12.1.4 logger

```
pkg.structure_core.Node.logger = logging.getLogger('node')
```

Definition at line 11 of file Node.py.

4.12.1.5 RED

```
tuple pkg.structure_core.Node.RED = (255, 0, 0)
```

Definition at line 8 of file Node.py.

4.13 pkg.structure_core.Structure Namespace Reference

Classes

- class [Structure](#)

Variables

- bool [DEBUG](#) = False
import itertools from ..tree_core.tree import Tree from .
- bool [STEPWISE](#) = False
- list [size](#) = [1500, 500]
- [screen](#) = pygame.display.set_mode([size](#))
- tuple [BLACK](#) = (0, 0, 0)
- tuple [WHITE](#) = (255, 255, 255)
- tuple [RED](#) = (255, 0, 0)
- tuple [GREEN](#) = (0, 255, 0)
- tuple [BLUE](#) = (0, 0, 255)

4.13.1 Variable Documentation

4.13.1.1 BLACK

```
tuple pkg.structure_core.Structure.BLACK = ( 0, 0, 0)
```

Definition at line 14 of file Structure.py.

4.13.1.2 BLUE

```
tuple pkg.structure_core.Structure.BLUE = ( 0, 0, 255)
```

Definition at line 18 of file Structure.py.

4.13.1.3 DEBUG

```
bool pkg.structure_core.Structure.DEBUG = False
```

```
import itertools from ..tree_core.tree import Tree from .
```

```
. import GapsHandeling debugging purpose
```

Definition at line 6 of file Structure.py.

4.13.1.4 GREEN

```
tuple pkg.structure_core.Structure.GREEN = ( 0, 255, 0)
```

Definition at line 17 of file Structure.py.

4.13.1.5 RED

```
tuple pkg.structure_core.Structure.RED = (255, 0, 0)
```

Definition at line 16 of file Structure.py.

4.13.1.6 screen

```
pkg.structure_core.Structure.screen = pygame.display.set_mode(size)
```

Definition at line 12 of file Structure.py.

4.13.1.7 size

```
list pkg.structure_core.Structure.size = [1500, 500]
```

Definition at line 11 of file Structure.py.

4.13.1.8 STEPWISE

```
bool pkg.structure_core.Structure.STEPWISE = False
```

Definition at line 7 of file Structure.py.

4.13.1.9 WHITE

```
tuple pkg.structure_core.Structure.WHITE = (255, 255, 255)
```

Definition at line 15 of file Structure.py.

4.14 pkg.tree_core Namespace Reference

Namespaces

- [NodeTree](#)
- [tree](#)

4.15 pkg.tree_core.NodeTree Namespace Reference

Classes

- class [NodeTree](#)

4.16 pkg.tree_core.tree Namespace Reference

Classes

- class [Tree](#)

Variables

- bool [PRINT](#) = False

4.16.1 Variable Documentation

4.16.1.1 PRINT

```
bool pkg.tree_core.tree.PRINT = False
```

Definition at line 3 of file tree.py.

4.17 pkg.write_xml Namespace Reference

Functions

- def [create_level](#) (root, index)
- def [create_component](#) (level, input_name, input_x1, input_x2, input_defoLength, input_end_lp=None)
- def [ask_for_new_level](#) (root)
- def [ask_for_new_member](#) (level, lp_i)
- def [ask_for_new_connection](#) (level, lp_i)
- def [prettify](#) (path)
- def [new_xml](#) ()

4.17.1 Function Documentation

4.17.1.1 ask_for_new_connection()

```
def pkg.write_xml.ask_for_new_connection (  
    level,  
    lp_i )
```

Definition at line 69 of file write_xml.py.

4.17.1.2 ask_for_new_level()

```
def pkg.write_xml.ask_for_new_level (  
    root )
```

Definition at line 36 of file write_xml.py.

4.17.1.3 ask_for_new_member()

```
def pkg.write_xml.ask_for_new_member (
    level,
    lp_i )
```

Definition at line 48 of file write_xml.py.

4.17.1.4 create_component()

```
def pkg.write_xml.create_component (
    level,
    input_name,
    input_x1,
    input_x2,
    input_defoLength,
    input_end_lp = None )
```

Definition at line 15 of file write_xml.py.

4.17.1.5 create_level()

```
def pkg.write_xml.create_level (
    root,
    index )
```

Definition at line 5 of file write_xml.py.

4.17.1.6 new_xml()

```
def pkg.write_xml.new_xml ( )
```

Definition at line 98 of file write_xml.py.

4.17.1.7 prettify()

```
def pkg.write_xml.prettify (
    path )
```

Definition at line 91 of file write_xml.py.

4.18 Visualization Namespace Reference

Namespaces

- [BlenderObject](#)
- [CreateVideo](#)
- [initialization](#)
- [Member](#)
- [setCamera](#)
- [setColor](#)
- [setFunction](#)
- [setLamp](#)
- [setRender](#)

4.19 Visualization.BlenderObject Namespace Reference

Classes

- class [BlenderObject](#)

Variables

- [meshElement](#) = bpy.ops.mesh.primitive_cube_add
- [meshMass](#) = bpy.ops.mesh.primitive_uv_sphere_add
- [meshText](#) = bpy.ops.object.text_add

4.19.1 Variable Documentation

4.19.1.1 meshElement

```
Visualization.BlenderObject.meshElement = bpy.ops.mesh.primitive_cube_add
```

Definition at line 15 of file BlenderObject.py.

4.19.1.2 meshMass

```
Visualization.BlenderObject.meshMass = bpy.ops.mesh.primitive_uv_sphere_add
```

Definition at line 17 of file BlenderObject.py.

4.19.1.3 meshText

```
Visualization.BlenderObject.meshText = bpy.ops.object.text_add
```

Definition at line 19 of file BlenderObject.py.

4.20 Visualization.CreateVideo Namespace Reference

Classes

- class [CreateVideo](#)

4.21 Visualization.initialization Namespace Reference

Functions

- def [initialize](#) ()
- def [static_numberOfElement](#) ()

4.21.1 Function Documentation

4.21.1.1 initialize()

```
def Visualization.initialization.initialize ( )
```

Prepare Blender for anew animation

Args:

nothing is taken

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 4 of file initialization.py.

4.21.1.2 static_numberOfElement()

```
def Visualization.initialization.static_numberOfElement ( )
```

Definition at line 40 of file initialization.py.

4.22 Visualization.Member Namespace Reference

Classes

- class [generalMember](#)

4.23 Visualization.setCamera Namespace Reference

Functions

- def [setCamera](#) (scene, x, y, z, lents)

4.23.1 Function Documentation

4.23.1.1 setCamera()

```
def Visualization.setCamera.setCamera (
    scene,
    x,
    y,
    z,
    lens )
```

Creates and configure the camera

Args:

- scene:
 - bpy.context.scene, contains the scene of the video
- x:
 - float, x coordinate of the position of the camera
- y:
 - float, y coordinate of the position of the camera
- z:
 - float, z coordinate of the position of the camera

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 3 of file setCamera.py.

4.24 Visualization.setColor Namespace Reference

Functions

- def [setColor](#) (ob, color)
- def [makeColor](#) (name, diffuse)

Variables

- def [red](#) = [makeColor](#)('Red', (1,0,0))
- def [blue](#) = [makeColor](#)('Blue', (0,0,1))
- def [black](#) = [makeColor](#)('Black', (0,0,0))
- def [white](#) = [makeColor](#)('White', (1,1,1))
- def [green](#) = [makeColor](#)('Green', (0,1,0))
- def [gray](#) = [makeColor](#)('Gray', (0.6,0.6,0.6))
- def [dark_gray](#) = [makeColor](#)('Gray', (0.2,0.2,0.2))

4.24.1 Function Documentation

4.24.1.1 makeColor()

```
def Visualization.setColor.makeColor (
    name,
    diffuse )
```

Creates color

Args:

name:
 string, name of the color
diffuse:
 value of difussion

Returns:

 new color

Raises:

 nothing is raised

Definition at line 21 of file setColor.py.

4.24.1.2 setColor()

```
def Visualization.setColor.setColor (
    ob,
    color )
```

Set the color of an object

Args:

ob:
 blender object, the object to color
color:
 color object, color

Returns:

 nothing is returned

Raises:

 nothing is raised

Definition at line 3 of file setColor.py.

4.24.2 Variable Documentation

4.24.2.1 black

```
def Visualization.setColor.black = makeColor('Black', (0,0,0))
```

Definition at line 47 of file setColor.py.

4.24.2.2 blue

```
def Visualization.setColor.blue = makeColor('Blue', (0,0,1))
```

Definition at line 46 of file setColor.py.

4.24.2.3 dark_gray

```
def Visualization.setColor.dark_gray = makeColor('Gray', (0.2,0.2,0.2))
```

Definition at line 51 of file setColor.py.

4.24.2.4 gray

```
def Visualization.setColor.gray = makeColor('Gray', (0.6,0.6,0.6))
```

Definition at line 50 of file setColor.py.

4.24.2.5 green

```
def Visualization.setColor.green = makeColor('Green', (0,1,0))
```

Definition at line 49 of file setColor.py.

4.24.2.6 red

```
def Visualization.setColor.red = makeColor('Red', (1,0,0))
```

Definition at line 45 of file setColor.py.

4.24.2.7 white

```
def Visualization.setColor.white = makeColor('White', (1,1,1))
```

Definition at line 48 of file setColor.py.

4.25 Visualization.setFunction Namespace Reference

Functions

- def [movement](#) (object, initialFrame, finalFrame, amount, offset=0)
- def [rotation](#) (object, initialFrame, finalFrame, amount)
- def [deformation](#) (object, initialFrame, finalFrame, amount)
- def [color](#) (object, initialFrame, color)
- def [elimination](#) (object, initialFrame, finalFrame)
- def [interpolation](#) (object)

4.25.1 Function Documentation

4.25.1.1 `color()`

```
def Visualization.setFunction.color (
    object,
    initialFrame,
    color )
```

Set the frames where the change of color takes place

Args:

- `object`:
blender mesh, current object which will color
- `initialFrame`:
integer, the starting frame of the color

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 95 of file `setFunction.py`.

4.25.1.2 `deformation()`

```
def Visualization.setFunction.deformation (
    object,
    initialFrame,
    finalFrame,
    amount )
```

Set the frames where the deformation takes place

Args:

- `object`:
blender mesh, current object which will deform
- `initialFrame`:
integer, the starting frame of the deformation
- `finalFrame`:
integer, the final frame of the deformation
- `amount`:
float, amount of deformation

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 66 of file `setFunction.py`.

4.25.1.3 elimination()

```
def Visualization.setFunction.elimination (
    object,
    initialFrame,
    finalFrame )
```

Set the frames where the removal of the tag takes place

Args:

- object*:
blender mesh, current object which will vanish
- initialFrame*:
integer, the starting frame of the vanishing
- finalFrame*:
integer, the final frame of the vanishing

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 120 of file setFunction.py.

4.25.1.4 interpolation()

```
def Visualization.setFunction.interpolation (
    object )
```

Linear interpolation
This interpolation makes the deformation and the movement smooth without any kind of acceleration

Args:

- object*:
blender mesh, current object

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 147 of file setFunction.py.

4.25.1.5 movement()

```
def Visualization.setFunction.movement (
    object,
    initialFrame,
    finalFrame,
    amount,
    offset = 0 )
```

Set the frames where the displacement takes place

Args:

- `object:`
blender mesh, current object which will move
- `initialFrame:`
integer, the starting frame of the movement
- `finalFrame:`
integer, the final frame of the movement
- `amount:`
float, amount of distance to move horizontally
- `offset:`
float, amount of distance to move vertically

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 4 of file `setFunction.py`.

4.25.1.6 rotation()

```
def Visualization.setFunction.rotation (
    object,
    initialFrame,
    finalFrame,
    amount )
```

Set the frames where the rotation takes place

Args:

- `object:`
blender mesh, current object which will rotate
- `initialFrame:`
integer, the starting frame of the rotation
- `finalFrame:`
integer, the final frame of the rotation
- `amount:`
float, amount of rotation

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 37 of file `setFunction.py`.

4.26 Visualization.setLamp Namespace Reference

Functions

- def [setLamp](#) (scene, x, y, z)

4.26.1 Function Documentation

4.26.1.1 setLamp()

```
def Visualization.setLamp.setLamp (
    scene,
    x,
    y,
    z )
```

Set lamp function

This function set the parameters to create the lights for the video

Args:

```
scene:
    bpy.context.scene, contains the scene of the video
x:
    float, x coordinate of the position of the lamp
y:
    float, y coordinate of the position of the lamp
z:
    float, z coordinate of the position of the lamp
```

Returns:

```
nothing is returned
```

Raises:

```
nothing is raised
```

Definition at line 3 of file setLamp.py.

4.27 Visualization.setRender Namespace Reference

Functions

- def [Parameters](#) (numberOfFrames, resolution, locationWall, locationBackground, width, height, path↵ Directory)

4.27.1 Function Documentation

4.27.1.1 Parameters()

```
def Visualization.setRender.Parameters (
    numberOfFrames,
    resolution,
    locationWall,
    locationBackground,
    width,
    height,
    pathDirectory )
```

Define the parameters of the render

Args:

- numberOfFrames:
 - integer, the number of frames of the animation.
- resolution:
 - float, the resolution
- locationWall:
 - coordinate of the position of the element which represents the blue wall.
- locationBackground:
 - coordinate of the position of the element which represents the background.
- width:
 - float, the width of the structure.
- height:
 - float, the height of the structure.
- pathdirectory:
 - string, path where the video will be store

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 19 of file setRender.py.

Chapter 5

Class Documentation

5.1 Visualization.BlenderObject.BlenderObject Class Reference

Public Member Functions

- `def __init__ (self, name, location, rotation, dimension, color, type)`
- `def get_geometricalObject (self)`

Public Attributes

- `name`
- `location`
- `rotation`
- `dimension`
- `color`
- `type`
- `object`
- `obj`

5.1.1 Detailed Description

Definition at line 21 of file BlenderObject.py.

5.1.2 Constructor & Destructor Documentation

5.1.2.1 __init__()

```
def Visualization.BlenderObject.BlenderObject.__init__ (
    self,
    name,
    location,
    rotation,
    dimension,
    color,
    type )
```

Set the color of an object

```

Args:
    name:
string, object name
    location:
coordinate of the object
    rotation:
define rotation
    dimension:
float, size of the object
    color
type:
type of blender object according to the definition above

Returns:
    nothing is returned

Raises:
    nothing is raised

```

Definition at line 28 of file BlenderObject.py.

5.1.3 Member Function Documentation

5.1.3.1 `get_geometricalObject()`

```

def Visualization.BlenderObject.BlenderObject.get_geometricalObject (
    self )

```

Define the object in Blender

```

Args:
    nothing is taken

Returns:
    nothing is returned

Raises:
    nothing is raised

```

Definition at line 63 of file BlenderObject.py.

5.1.4 Member Data Documentation

5.1.4.1 `color`

```

Visualization.BlenderObject.BlenderObject.color

```

Definition at line 59 of file BlenderObject.py.

5.1.4.2 `dimension`

```

Visualization.BlenderObject.BlenderObject.dimension

```

Definition at line 57 of file BlenderObject.py.

5.1.4.3 location

`Visualization.BlenderObject.BlenderObject.location`

Definition at line 53 of file `BlenderObject.py`.

5.1.4.4 name

`Visualization.BlenderObject.BlenderObject.name`

Definition at line 51 of file `BlenderObject.py`.

5.1.4.5 obj

`Visualization.BlenderObject.BlenderObject.obj`

Definition at line 83 of file `BlenderObject.py`.

5.1.4.6 object

`Visualization.BlenderObject.BlenderObject.object`

Definition at line 78 of file `BlenderObject.py`.

5.1.4.7 rotation

`Visualization.BlenderObject.BlenderObject.rotation`

Definition at line 55 of file `BlenderObject.py`.

5.1.4.8 type

`Visualization.BlenderObject.BlenderObject.type`

Definition at line 61 of file `BlenderObject.py`.

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

- Visualization/[BlenderObject.py](#)

5.2 pkg.isdh.component.Component Class Reference

Public Member Functions

- `def __init__(self, name, x1, x2, defo_length, lp_level1, lp_level2, p=0)`
- `def __repr__(self)`

Public Attributes

- [name](#)
- [x1](#)
- [x2](#)
- [defo_length](#)
- [lp_level1](#)
- [lp_level2](#)
- [mass](#)
- [mass_position](#)

5.2.1 Detailed Description

Definition at line 1 of file component.py.

5.2.2 Constructor & Destructor Documentation

5.2.2.1 `__init__()`

```
def pkg.isdh.component.Component.__init__ (
    self,
    name,
    x1,
    x2,
    defo_length,
    lp_level1,
    lp_level2,
    p = 0 )
```

Definition at line 2 of file component.py.

5.2.3 Member Function Documentation

5.2.3.1 `__repr__()`

```
def pkg.isdh.component.Component.__repr__ (
    self )
```

Return the string representation of the object.

Args:
 nothing is taken
Returns:
 string
Raises:
 nothing is raised

Definition at line 16 of file component.py.

5.2.4 Member Data Documentation

5.2.4.1 defo_length

`pkg.isdh.component.Component.defo_length`

Definition at line 7 of file `component.py`.

5.2.4.2 lp_level1

`pkg.isdh.component.Component.lp_level1`

Definition at line 8 of file `component.py`.

5.2.4.3 lp_level2

`pkg.isdh.component.Component.lp_level2`

Definition at line 9 of file `component.py`.

5.2.4.4 mass

`pkg.isdh.component.Component.mass`

Definition at line 12 of file `component.py`.

5.2.4.5 mass_position

`pkg.isdh.component.Component.mass_position`

Definition at line 13 of file `component.py`.

5.2.4.6 name

`pkg.isdh.component.Component.name`

Definition at line 4 of file `component.py`.

5.2.4.7 x1

`pkg.isdh.component.Component.x1`

Definition at line 5 of file `component.py`.

5.2.4.8 x2

`pkg.isdh.component.Component.x2`

Definition at line 6 of file `component.py`.

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

- [pkg/isdh/component.py](#)

5.3 pkg.structure_core.Component.Component Class Reference

Public Member Functions

- `def __init__ (self, leftNode, rightNode, rigidLength, componentsName, isGap=False)`
- `def __repr__ (self)`
- `def draw (self, screen, offset, y_scaling)`
- `def length (self)`
- `def deformable_length (self)`
- `def moves (self, list_of_nodes)`
- `def link_to_barrier (self)`
- `def link_to_firewall (self)`
- `def next_gap (self)`

Public Attributes

- `name`
- `leftNode`
- `rightNode`
- `rigidLength`
- `isGap`
- `connectedToBarrier`
- `connectedToFirewall`

5.3.1 Detailed Description

Defines the components in the topological model

Definition at line 20 of file `Component.py`.

5.3.2 Constructor & Destructor Documentation

5.3.2.1 `__init__()`

```
def pkg.structure_core.Component.Component.__init__ (
    self,
    leftNode,
    rightNode,
    rigidLength,
    componentsName,
    isGap = False )
```

Constructs the class `structure_core.Component.Component`.

Args:
 `leftNode`:
the node object that defines the left node of the component
 `rightNode`:
the node object that defines the right node of the component
 `rigidLength`:
scalar value of the rigid length of the component
 `componentsName`:
string that represents the name of the component
Returns:
 an object of the class.
Raises:
 nothing is raised.

Definition at line 27 of file `Component.py`.

5.3.3 Member Function Documentation

5.3.3.1 `__repr__()`

```
def pkg.structure_core.Component.Component.__repr__ (
    self )
```

Definition at line 57 of file `Component.py`.

5.3.3.2 `deformable_length()`

```
def pkg.structure_core.Component.Component.deformable_length (
    self )
```

Calculates the current deformable length of the component.

Args:
 nothing is taken.
Returns:
 scalar value of the current deformable length of the component.
Raises:
 nothings is raised.

Definition at line 107 of file `Component.py`.

5.3.3.3 draw()

```
def pkg.structure_core.Component.Component.draw (
    self,
    screen,
    offset,
    y_scaling )
```

Draws onto the screen the current statw of the structure (DEBUG purpose).

Args:
 screen:
defines the screen to output the debugging data and its properties
 offset:
...
 y_scaling:
...
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 60 of file Component.py.

5.3.3.4 length()

```
def pkg.structure_core.Component.Component.length (
    self )
```

Definition at line 103 of file Component.py.

5.3.3.5 link_to_barrier()

```
def pkg.structure_core.Component.Component.link_to_barrier (
    self )
```

Determine whether the component is connected to the barrier (no gap is standing in its way).

Args:
 nothing is taken.
Returns:
 nothing is returned.
Raises:
 nothing is raised.

Definition at line 141 of file Component.py.

5.3.3.6 link_to_firewall()

```
def pkg.structure_core.Component.Component.link_to_firewall (
    self )
```

Determine whether the component is connected to the firewall (no gap is standing in its way).

Args:
 nothing is taken.
Returns:
 nothing is returned.
Raises:
 nothing is raised.

Definition at line 161 of file Component.py.

5.3.3.7 moves()

```
def pkg.structure_core.Component.Component.moves (
    self,
    list_of_nodes )
```

Determines the nodes that are going to be moved as a result to the defomation step.

Args:
 list_of_nodes:
list that contains the nodes that are deforming their components
Returns:
 list of the nodes that are going to be moved by the deformation step.
Raises:
 nothing is raised.

Definition at line 124 of file Component.py.

5.3.3.8 next_gap()

```
def pkg.structure_core.Component.Component.next_gap (
    self )
```

Determines whether there is another gap along the loadpath to be deformed.

Args:
 nothing is taken.
Returns:
 if there is no other gap left, it returns None, otherwise the gap object.
Raises:
 nothing is raised.

Definition at line 181 of file Component.py.

5.3.4 Member Data Documentation

5.3.4.1 `connectedToBarrier`

`pkg.structure_core.Component.Component.connectedToBarrier`

Definition at line 51 of file `Component.py`.

5.3.4.2 `connectedToFirewall`

`pkg.structure_core.Component.Component.connectedToFirewall`

Definition at line 52 of file `Component.py`.

5.3.4.3 `isGap`

`pkg.structure_core.Component.Component.isGap`

Definition at line 50 of file `Component.py`.

5.3.4.4 `leftNode`

`pkg.structure_core.Component.Component.leftNode`

Definition at line 47 of file `Component.py`.

5.3.4.5 `name`

`pkg.structure_core.Component.Component.name`

Definition at line 46 of file `Component.py`.

5.3.4.6 `rightNode`

`pkg.structure_core.Component.Component.rightNode`

Definition at line 48 of file `Component.py`.

5.3.4.7 `rigidLength`

`pkg.structure_core.Component.Component.rigidLength`

Definition at line 49 of file `Component.py`.

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

- `pkg/structure_core/Component.py`

5.4 Visualization.CreateVideo.CreateVideo Class Reference

Public Member Functions

- `def __init__ (self, i_s, d_h, v_o, fps, resolution, pathDirectory)`

5.4.1 Detailed Description

Definition at line 11 of file CreateVideo.py.

5.4.2 Constructor & Destructor Documentation

5.4.2.1 `__init__()`

```
def Visualization.CreateVideo.CreateVideo.__init__ (
    self,
    i_s,
    d_h,
    v_o,
    fps,
    resolution,
    pathDirectory )
```

Creates video in blender

Args:

- `i_s`:
initial state
- `d_h`:
deformation history
- `v_o`:
vertical offset-distance between horizontal paths
- `fps`:
frames per second
- `resolution`:
Number of pixels in the render image
- `path directory`:
path where the video will be stored

Returns:

- nothing is returned

Raises:

- exceptions raised by the initial state

Definition at line 18 of file CreateVideo.py.

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

- Visualization/[CreateVideo.py](#)

5.5 pkg.structure_core.CrossComponent.CrossComponent Class Reference

Public Member Functions

- def `__init__` (self, `name`, `leftNode`, `rightNode`, `rigidLength`)
- def `__repr__` (self)
- def `draw` (self, `screen`, `offset`, `y_scaling`)
- def `left_deforms` (self, `list_of_nodes`)
- def `right_deforms` (self, `list_of_nodes`)
- def `length` (self)
- def `deformable_length` (self)
- def `is_valid` (self)
- def `link_to_barrier` (self)
- def `link_to_firewall` (self)

Public Attributes

- `name`
- `leftNode`
- `rightNode`
- `rigidLength`
- `breakable`
- `broken`
- `connectedToBarrier`
- `connectedToFirewall`

5.5.1 Detailed Description

Defiens the cross-components in the topological model

Definition at line 17 of file CrossComponent.py.

5.5.2 Constructor & Destructor Documentation

5.5.2.1 `__init__()`

```
def pkg.structure_core.CrossComponent.CrossComponent.__init__ (
    self,
    name,
    leftNode,
    rightNode,
    rigidLength )
```

Constructs the clas `structure_core.CrossComponent.crossComponent`.

Args:

- `name`:
string of the name of the cross_component
- `leftNode`:
node object of the left node of the cross_component
- `rightNode`:
node object of the right node of the cross_component
- `rigidLength`:
scalar value of the rigid length of the cross_component

Returns:

- an object of the class.

Raises:

- nothing is raised.

Definition at line 23 of file CrossComponent.py.

5.5.3 Member Function Documentation

5.5.3.1 `__repr__()`

```
def pkg.structure_core.CrossComponent.CrossComponent.__repr__ (
    self )
```

Definition at line 56 of file CrossComponent.py.

5.5.3.2 `deformable_length()`

```
def pkg.structure_core.CrossComponent.CrossComponent.deformable_length (
    self )
```

Calculates the current deformable length of the cross_component.

Args:

nothing is taken.

Returns:

scalar value of the current deformable length of the cross_component.

Raises:

nothings is raised.

Definition at line 150 of file CrossComponent.py.

5.5.3.3 `draw()`

```
def pkg.structure_core.CrossComponent.CrossComponent.draw (
    self,
    screen,
    offset,
    y_scaling )
```

Draws onto the screen the current statw of the structure (DEBUG purpose).

Args:

screen:

defines the screen to output the debugging data and its properties

offset:

...

y_scaling:

...

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 59 of file CrossComponent.py.

5.5.3.4 `is_valid()`

```
def pkg.structure_core.CrossComponent.CrossComponent.is_valid (  
    self )
```

Determines whether the `cross_component` is broken.

Args:

nothing is taken.

Returns:

True if the `cross_component` is not broken, False otherwise.

Raises:

nothing is raised.

Definition at line 166 of file `CrossComponent.py`.

5.5.3.5 `left_deforms()`

```
def pkg.structure_core.CrossComponent.CrossComponent.left_deforms (  
    self,  
    list_of_nodes )
```

Determines whether the deformation step will move the left node of the `cross_component`.

Args:

`list_of_nodes`:

list that contains the nodes that are deforming their components

Returns:

True if the deformation step will lead to motion to the left node, False otherwise.

Raises:

nothing is raised.

Definition at line 104 of file `CrossComponent.py`.

5.5.3.6 `length()`

```
def pkg.structure_core.CrossComponent.CrossComponent.length (  
    self )
```

Calculates the current length of the `cross_component`.

Args:

nothing is taken.

Returns:

scalar value of the current length of the `cross_component`.

Raises:

nothing is raised.

Definition at line 138 of file `CrossComponent.py`.

5.5.3.7 link_to_barrier()

```
def pkg.structure_core.CrossComponent.CrossComponent.link_to_barrier (
    self )
```

Determine whether the cross_component is connected to the barrier
(no gap is standing in its way).

Args:

nothing is taken.

Returns:

nothing is returned.

Raises:

nothing is raised.

Definition at line 178 of file CrossComponent.py.

5.5.3.8 link_to_firewall()

```
def pkg.structure_core.CrossComponent.CrossComponent.link_to_firewall (
    self )
```

Determine whether the cross_component is connected to the firewall
(no gap is standing in its way).

Args:

nothing is taken.

Returns:

nothing is returned.

Raises:

nothing is raised.

Definition at line 195 of file CrossComponent.py.

5.5.3.9 right_deforms()

```
def pkg.structure_core.CrossComponent.CrossComponent.right_deforms (
    self,
    list_of_nodes )
```

Determines whether the deformation step will move the right node of the
cross_component.

Args:

list_of_nodes:

list that contains the nodes that are deforming their components

Returns:

True if the deformation step will lead to motion to the right node, False otherwise.

Raises:

nothing is raised.

Definition at line 121 of file CrossComponent.py.

5.5.4 Member Data Documentation

5.5.4.1 breakable

`pkg.structure_core.CrossComponent.CrossComponent.breakable`

Definition at line 47 of file `CrossComponent.py`.

5.5.4.2 broken

`pkg.structure_core.CrossComponent.CrossComponent.broken`

Definition at line 48 of file `CrossComponent.py`.

5.5.4.3 connectedToBarrier

`pkg.structure_core.CrossComponent.CrossComponent.connectedToBarrier`

Definition at line 50 of file `CrossComponent.py`.

5.5.4.4 connectedToFirewall

`pkg.structure_core.CrossComponent.CrossComponent.connectedToFirewall`

Definition at line 51 of file `CrossComponent.py`.

5.5.4.5 leftNode

`pkg.structure_core.CrossComponent.CrossComponent.leftNode`

Definition at line 43 of file `CrossComponent.py`.

5.5.4.6 name

`pkg.structure_core.CrossComponent.CrossComponent.name`

Definition at line 42 of file `CrossComponent.py`.

5.5.4.7 rightNode

`pkg.structure_core.CrossComponent.CrossComponent.rightNode`

Definition at line 44 of file `CrossComponent.py`.

5.5.4.8 rigidLength

`pkg.structure_core.CrossComponent.CrossComponent.rigidLength`

Definition at line 45 of file `CrossComponent.py`.

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

- `pkg/structure_core/CrossComponent.py`

5.6 pkg.isdh.deformation_step.DeformationStep Class Reference

Public Member Functions

- `def __init__` (self, [amount](#), `initial_deformation_amount`, [transformation](#))

Public Attributes

- [amount](#)
- [frame_begin](#)
- [frame_end](#)
- [transformation](#)

5.6.1 Detailed Description

Definition at line 1 of file `deformation_step.py`.

5.6.2 Constructor & Destructor Documentation

5.6.2.1 __init__()

```
def pkg.isdh.deformation_step.DeformationStep.__init__ (
    self,
    amount,
    initial_deformation_amount,
    transformation )
```

Definition at line 2 of file `deformation_step.py`.

5.6.3 Member Data Documentation

5.6.3.1 amount

`pkg.isdh.deformation_step.DeformationStep.amount`

Definition at line 3 of file `deformation_step.py`.

5.6.3.2 frame_begin

`pkg.isdh.deformation_step.DeformationStep.frame_begin`

Definition at line 4 of file `deformation_step.py`.

5.6.3.3 frame_end

`pkg.isdh.deformation_step.DeformationStep.frame_end`

Definition at line 5 of file `deformation_step.py`.

5.6.3.4 transformation

`pkg.isdh.deformation_step.DeformationStep.transformation`

Definition at line 6 of file `deformation_step.py`.

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

- [pkg/isdh/deformation_step.py](#)

5.7 Visualization.Member.generalMember Class Reference

Public Member Functions

- `def __init__` (self, nameOfMember, x1, x2, deformableLength, level1, level2, separation, [mass_position](#)=0)
- `def __repr__` (self)
- `def move` (self, initialFrame, finalFrame, distance)
- `def deform` (self, initialFrame, finalFrame, amount, newAmount, newAngle, oldAngle, newDefoLength, oldDefoLength, currentStep, numberOfSteps)

Public Attributes

- [dL](#)
- [l1](#)
- [l2](#)
- [sep](#)
- [mass_position](#)
- [dY](#)
- [dX](#)
- [rL](#)
- [angle](#)
- [totalLength](#)
- [rDL](#)
- [rRL](#)
- [elementSize](#)
- [rPM](#)
- [deformPart](#)
- [nonDeformPart](#)
- [tag](#)
- [INode](#)
- [rNode](#)
- [mass](#)

5.7.1 Detailed Description

Definition at line 14 of file Member.py.

5.7.2 Constructor & Destructor Documentation

5.7.2.1 `__init__()`

```
def Visualization.Member.generalMember.__init__ (
    self,
    nameOfMember,
    x1,
    x2,
    deformableLength,
    level1,
    level2,
    separation,
    mass_position = 0 )
```

Creates the object member

Args:

numberOfFrames:
float, number of frames that the objects needs for the action
x1:
float, location in x of the point one
x2:
float, location in x of the point two
deformableLength:
float, deformable length
level1:
float, level of point one
level2:
float, level of point two
separation:
float, vertical position of the element
mass_position:
float, the absolute position of mass

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 23 of file Member.py.

5.7.3 Member Function Documentation

5.7.3.1 `__repr__()`

```
def Visualization.Member.generalMember.__repr__ (
    self )
```

Definition at line 158 of file Member.py.

5.7.3.2 deform()

```
def Visualization.Member.generalMember.deform (
    self,
    initialFrame,
    finalFrame,
    amount,
    newAmount,
    newAngle,
    oldAngle,
    newDefoLength,
    oldDefoLength,
    currentStep,
    numberOfSteps )
```

Define the movement of the element

Args:

- initialFrame:
- integer, the initial frame of the movement
- finalFrame:
- integer, the final frame of the movement
- amount:
- float, the previous value of the amount of deformation
- newAmount:
- float, the current value of the amount of deformation
- newAngle:
- float, the current angle to rotate
- oldAngle:
- float, the old angle to rotate
- newDefoLength:
- float, the current deformable length
- oldDefoLength:
- float, the old deformable length
- currentStep:
- integer, steps in which the action is
- numberOfSteps:
- integer, number of steps that covers the action

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 224 of file Member.py.

5.7.3.3 move()

```
def Visualization.Member.generalMember.move (
    self,
    initialFrame,
    finalFrame,
    distance )
```

Define the movement of the element

Args:

- initialFrame:
- integer, the initial frame of the movement
- finalFrame:

integer, the final frame of the movement
distance:
float, the distance of movement

Returns:
nothing is returned

Raises:
nothing is raised

Definition at line 164 of file Member.py.

5.7.4 Member Data Documentation

5.7.4.1 angle

Visualization.Member.generalMember.angle

Definition at line 68 of file Member.py.

5.7.4.2 deformPart

Visualization.Member.generalMember.deformPart

Definition at line 93 of file Member.py.

5.7.4.3 dL

Visualization.Member.generalMember.dL

Definition at line 52 of file Member.py.

5.7.4.4 dX

Visualization.Member.generalMember.dX

Definition at line 64 of file Member.py.

5.7.4.5 dY

Visualization.Member.generalMember.dY

Definition at line 62 of file Member.py.

5.7.4.6 elementSize

Visualization.Member.generalMember.elementSize

Definition at line 76 of file Member.py.

5.7.4.7 l1

`Visualization.Member.generalMember.l1`

Definition at line 54 of file Member.py.

5.7.4.8 l2

`Visualization.Member.generalMember.l2`

Definition at line 56 of file Member.py.

5.7.4.9 lNode

`Visualization.Member.generalMember.lNode`

Definition at line 131 of file Member.py.

5.7.4.10 mass

`Visualization.Member.generalMember.mass`

Definition at line 156 of file Member.py.

5.7.4.11 mass_position

`Visualization.Member.generalMember.mass_position`

Definition at line 60 of file Member.py.

5.7.4.12 nonDeformPart

`Visualization.Member.generalMember.nonDeformPart`

Definition at line 107 of file Member.py.

5.7.4.13 rDL

`Visualization.Member.generalMember.rDL`

Definition at line 72 of file Member.py.

5.7.4.14 rL

`Visualization.Member.generalMember.rL`

Definition at line 66 of file Member.py.

5.7.4.15 rNode

`Visualization.Member.generalMember.rNode`

Definition at line 143 of file Member.py.

5.7.4.16 rPM

`Visualization.Member.generalMember.rPM`

Definition at line 78 of file Member.py.

5.7.4.17 rRL

`Visualization.Member.generalMember.rRL`

Definition at line 74 of file Member.py.

5.7.4.18 sep

`Visualization.Member.generalMember.sep`

Definition at line 58 of file Member.py.

5.7.4.19 tag

`Visualization.Member.generalMember.tag`

Definition at line 119 of file Member.py.

5.7.4.20 totalLength

`Visualization.Member.generalMember.totalLength`

Definition at line 70 of file Member.py.

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

- Visualization/[Member.py](#)

5.8 pkg.isdh.isdh_helper.IsdhHelper Class Reference

Public Member Functions

- def `__init__` (self)
- def `register` (self, tree)
- def `save` (self, activeNode)
- def `unsave` (self, activeNode)
- def `save_defo_step` (self, comp, stepType, stepAmount)
- def `update_amount` (self, amount)
- def `init_ood` (self)
- def `copy_ood` (self)
- def `save_ood` (self)

Public Attributes

- `i_s`
- `d_h`
- `isdh_dict`
- `ood`
- `amount`

5.8.1 Detailed Description

Definition at line 5 of file `isdh_helper.py`.

5.8.2 Constructor & Destructor Documentation

5.8.2.1 `__init__()`

```
def pkg.isdh.isdh_helper.IsdhHelper.__init__ (  
    self )
```

Definition at line 6 of file `isdh_helper.py`.

5.8.3 Member Function Documentation

5.8.3.1 `copy_ood()`

```
def pkg.isdh.isdh_helper.IsdhHelper.copy_ood (  
    self )
```

Return a copy of `self.ood`, with original key and a copy of value.

The copy returned is a dictionary, in which the keys are references to the original keys, and the values are copies.
This way the items in `self.i_s` can be used as keys for the copy and, at the same time, modifications to `self.ood` do not modify the copy.

Args:

nothing is taken.

Returns:

a dictionary is returned.

Raises:

nothing is raised.

Definition at line 207 of file `isdh_helper.py`.

5.8.3.2 init_ood()

```
def pkg.isdh.isdh_helper.IsdhHelper.init_ood (
    self )
```

Initialise self.ood.

Args:

nothing is taken

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 192 of file isdh_helper.py.

5.8.3.3 register()

```
def pkg.isdh.isdh_helper.IsdhHelper.register (
    self,
    tree )
```

Register the saver to tree.

Append self to tree.savers, initialise self.i_s, initialise self.ood.

Args:

tree:

a tree_core.tree.Tree object

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 13 of file isdh_helper.py.

5.8.3.4 save()

```
def pkg.isdh.isdh_helper.IsdhHelper.save (
    self,
    activeNode )
```

Save a defromation step of the whole structure.

Args:

activeNode:

a tree_core.node_tree.NodeTree object

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 71 of file isdh_helper.py.

5.8.3.5 save_defo_step()

```
def pkg.isdh.isdh_helper.IsdhHelper.save_defo_step (
    self,
    comp,
    stepType,
    stepAmount )
```

Save or un-save a deformation step of one component.

Args:

- comp:
 - a structure_core.component.Component object
 - or
 - a structure_core.cross_component.CrossComponent object
- stepType:
 - 'd' or 'm' (deformation or movement)
- stepAmount:
 - a double, the amount of deformation of the step

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 134 of file isdh_helper.py.

5.8.3.6 save_ood()

```
def pkg.isdh.isdh_helper.IsdhHelper.save_ood (
    self )
```

Save the Order of Deformation in self.ood as a solution.

Args:

- nothing is taken.

Returns:

- nothing is returned.

Raises:

- nothing is raised.

Definition at line 227 of file isdh_helper.py.

5.8.3.7 unsave()

```
def pkg.isdh.isdh_helper.IsdhHelper.unsave (
    self,
    activeNode )
```

Un-save a defromation step of the whole structure.

Args:

- activeNode:
 - a tree_core.node_tree.NodeTree object

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 103 of file isdh_helper.py.

5.8.3.8 update_amount()

```
def pkg.isdh.isdh_helper.IsdhHelper.update_amount (
    self,
    amount )
```

Update the amount of deformation occurred so far.

Args:
 amount:
a double, the amount of deformation of the new deformation step.
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 178 of file isdh_helper.py.

5.8.4 Member Data Documentation

5.8.4.1 amount

```
pkg.isdh.isdh_helper.IsdhHelper.amount
```

Definition at line 11 of file isdh_helper.py.

5.8.4.2 d_h

```
pkg.isdh.isdh_helper.IsdhHelper.d_h
```

Definition at line 8 of file isdh_helper.py.

5.8.4.3 i_s

```
pkg.isdh.isdh_helper.IsdhHelper.i_s
```

Definition at line 7 of file isdh_helper.py.

5.8.4.4 isdh_dict

```
pkg.isdh.isdh_helper.IsdhHelper.isdh_dict
```

Definition at line 9 of file isdh_helper.py.

5.8.4.5 ood

`pkg.isdh.isdh_helper.IsdhHelper.ood`

Definition at line 10 of file `isdh_helper.py`.

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

- `pkg/isdh/isdh_helper.py`

5.9 pkg.structure_core.Loadpath.Loadpath Class Reference

Public Member Functions

- `def __init__(self, level)`

Public Attributes

- `listComponents`
- `setNodes`
- `level`

5.9.1 Detailed Description

Groups all components and nodes at the same loadpath level.

Definition at line 3 of file `Loadpath.py`.

5.9.2 Constructor & Destructor Documentation

5.9.2.1 __init__()

```
def pkg.structure_core.Loadpath.Loadpath.__init__(  
    self,  
    level )
```

Constructor of the class `structure_core.loadpath.Loadpath`.

Args:

level:

an integer, that identifies the loadpath level

Returns:

an object of the class.

Raises:

nothing is raised.

Definition at line 6 of file `Loadpath.py`.

5.9.3 Member Data Documentation

5.9.3.1 level

`pkg.structure_core.Loadpath.Loadpath.level`

Definition at line 19 of file Loadpath.py.

5.9.3.2 listComponents

`pkg.structure_core.Loadpath.Loadpath.listComponents`

Definition at line 17 of file Loadpath.py.

5.9.3.3 setNodes

`pkg.structure_core.Loadpath.Loadpath.setNodes`

Definition at line 18 of file Loadpath.py.

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

- [pkg/structure_core/Loadpath.py](#)

5.10 pkg.structure_core.Node.Node Class Reference

Public Member Functions

- `def __init__(self, point, loadpathLevel)`
- `def __repr__(self)`
- `def __eq__(self, other)`
- `def __hash__(self)`
- `def draw(self, screen, offset, y_scaling)`
- `def change_position(self, deformationStep)`

Static Public Attributes

- [position](#)
- [loadpathLevel](#)
- [towardsFirewall](#)
- [towardsBarrier](#)
- [onFirewall](#)
- [onBarrier](#)

5.10.1 Detailed Description

Constructs the nodes that define the boundary of the components

Definition at line 14 of file Node.py.

5.10.2 Constructor & Destructor Documentation

5.10.2.1 `__init__()`

```
def pkg.structure_core.Node.Node.__init__ (
    self,
    point,
    loadpathLevel )
```

Definition at line 17 of file Node.py.

5.10.3 Member Function Documentation

5.10.3.1 `__eq__()`

```
def pkg.structure_core.Node.Node.__eq__ (
    self,
    other )
```

Definition at line 41 of file Node.py.

5.10.3.2 `__hash__()`

```
def pkg.structure_core.Node.Node.__hash__ (
    self )
```

Definition at line 49 of file Node.py.

5.10.3.3 `__repr__()`

```
def pkg.structure_core.Node.Node.__repr__ (
    self )
```

Definition at line 37 of file Node.py.

5.10.3.4 change_position()

```
def pkg.structure_core.Node.Node.change_position (
    self,
    deformationStep )
```

Chnages the position of the node.

Args:
 deformationStep:
 the amount of the motion the node should move with
Returns:
 nothing is returned
Raises:
 notjhing is raised

Definition at line 79 of file Node.py.

5.10.3.5 draw()

```
def pkg.structure_core.Node.Node.draw (
    self,
    screen,
    offset,
    y_scaling )
```

Draws onto the screan the current statw of the structure (DEBUG purpose).

Args:
 screan:
 defines the screan to output the debugging data and its properties
 offset:
 ...
 y_scaling:
 ...
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 52 of file Node.py.

5.10.4 Member Data Documentation

5.10.4.1 loadpathLevel

```
pkg.structure_core.Node.Node.loadpathLevel [static]
```

Definition at line 31 of file Node.py.

5.10.4.2 onBarrier

```
pkg.structure_core.Node.Node.onBarrier [static]
```

Definition at line 35 of file Node.py.

5.10.4.3 onFirewall

`pkg.structure_core.Node.Node.onFirewall` [static]

Definition at line 34 of file Node.py.

5.10.4.4 position

`pkg.structure_core.Node.Node.position` [static]

Constructor of the class `structure_core.Node.Node`.

Args:

`point`:
a scalar value defines the position of the node
`loadpathLevel`:
a scalar value defines the level of the containing loadpath
Returns:
an object of the class
Raises:
nothing is raised

Definition at line 30 of file Node.py.

5.10.4.5 towardsBarrier

`pkg.structure_core.Node.Node.towardsBarrier` [static]

Definition at line 33 of file Node.py.

5.10.4.6 towardsFirewall

`pkg.structure_core.Node.Node.towardsFirewall` [static]

Definition at line 32 of file Node.py.

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

- `pkg/structure_core/Node.py`

5.11 pkg.tree_core.NodeTree.NodeTree Class Reference

Public Member Functions

- `def __init__` (self, `deformingComps`, `structure`=None, `parent`=None)
- `def __repr__` (self)
- `def d_print` (self)
- `def add_child` (self, `deformingComps`, `structure`)
- `def check_amount` (self)
- `def next_children` (self, `previous_children`=None)
- `def substitute_children` (self, `next_children`)
- `def determine_amount` (self)
- `def cross_components_amount` (self, `deformationLeadingNodes`)
- `def check_keep_deforming` (self)
- `def deform` (self)
- `def undeform` (self)

Public Attributes

- [amount](#)
- [structure](#)
- [parent](#)
- [children](#)
- [isValid](#)
- [keep](#)
- [substitute](#)
- [deformingComps](#)
- [movingComps](#)
- [deformingCrossComps](#)
- [movingCrossComps](#)
- [stretchingCrossComps](#)

5.11.1 Detailed Description

Definition at line 2 of file NodeTree.py.

5.11.2 Constructor & Destructor Documentation

5.11.2.1 `__init__()`

```
def pkg.tree_core.NodeTree.NodeTree.__init__ (
    self,
    deformingComps,
    structure = None,
    parent = None )
```

Definition at line 3 of file NodeTree.py.

5.11.3 Member Function Documentation

5.11.3.1 `__repr__()`

```
def pkg.tree_core.NodeTree.NodeTree.__repr__ (
    self )
```

Return the string representation of the object.

If the `isValid` attribute is defined and `True`, the string representation of the `deformingComps` attribute is returned.

If the `isValid` attribute is defined and `False`, the string `INVALID` is returned

If the `isValid` attribute is not defined, `"NodeTree obj"` is returned.

Args:

nothing is taken

Returns:

string

Raises:

nothing is raised

Definition at line 18 of file NodeTree.py.

5.11.3.2 add_child()

```
def pkg.tree_core.NodeTree.NodeTree.add_child (
    self,
    deformingComps,
    structure )
```

Append a child to the list `self.children`.

If the child is not valid, because the `deformingComps` contains undeformable gaps, other children are created (varying `deformingComps`). This process continues until a valid list of children is found. Then the list is appended to the list `self.children`.

Args:

- `deformingComps`:
tuple of `structure_core.Component` objects to deform
- `structure`:
the unique `structure_core.Structure` object, to which `structure_core.Component` objects belong

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 59 of file `NodeTree.py`.

5.11.3.3 check_amount()

```
def pkg.tree_core.NodeTree.NodeTree.check_amount (
    self )
```

Saves the amount of deformation in `self.amount`.

The amount of deformation that the structure can overcome, for the deforming components, is determined. If the amount is 0, the node is marked as invalid. If there is any gap in `self.deformingComps`, the attribute `self.substitute` is set to `True`, so that the node can be replaced by other nodes which contain different gaps.

Args:

- nothing is taken

Returns:

- nothing is returned

Raises:

- nothing is raised

Definition at line 95 of file `NodeTree.py`.

5.11.3.4 check_keep_deforming()

```
def pkg.tree_core.NodeTree.NodeTree.check_keep_deforming (
    self )
```

Check if the components are still deforming after the previous step.

When the attribute keep of the parent nodeTree is True, all the components, that were deforming in the previous deformation step, should keep on deforming. Thus, if this is not the case, the NodeTree is marked as invalid.

Args:

nothing is taken

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 323 of file NodeTree.py.

5.11.3.5 cross_components_amount()

```
def pkg.tree_core.NodeTree.NodeTree.cross_components_amount (
    self,
    deformationLeadingNodes )
```

Returns the amount of deformation allowed by the crossComponents.

Args:

deformationLeadingNodes:

list of Node objects.

Returns:

a double, if there are deforming crossComponents.

None, otherwise.

Raises:

nothing is raised.

Definition at line 247 of file NodeTree.py.

5.11.3.6 d_print()

```
def pkg.tree_core.NodeTree.NodeTree.d_print (
    self )
```

Prints a detailed description of the object state.

Args:

nothing is taken

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 42 of file NodeTree.py.

5.11.3.7 deform()

```
def pkg.tree_core.NodeTree.NodeTree.deform (
    self )
```

Deforms the structure, as defined by self.deformingComps.

Args:
 nothing is taken
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 350 of file NodeTree.py.

5.11.3.8 determine_amount()

```
def pkg.tree_core.NodeTree.NodeTree.determine_amount (
    self )
```

Computes the correct value of the deformation amount.

The deformation amount of the structure is first determined as the minimum deformable length of the deformingComps. Then connections are taken into account. Finally, the minimum amount is saved in self.amount.

Args:
 nothing is taken
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 200 of file NodeTree.py.

5.11.3.9 next_children()

```
def pkg.tree_core.NodeTree.NodeTree.next_children (
    self,
    previous_children = None )
```

Returns a list of NodeTree objects to replace the previous list.

For each NodeTree object in previous_children, a list of NodeTree objects is generated. The NodeTree objects in this list are a clone of the original NodeTree object, where a gap in deformingComps has been replaced by the next right gap. The union of all these lists gives the next_children list.

Args:
 previous_children:
 list of NodeTree objects.
Returns:
 list of NodeTree objects.
Raises:
 nothing is raised.

Definition at line 118 of file NodeTree.py.

5.11.3.10 substitute_children()

```
def pkg.tree_core.NodeTree.NodeTree.substitute_children (
    self,
    next_children )
```

Sets the objects in next_children as proper children of self.parent.

Args:

self:
the NodeTree object 'child' to substitute, created in
.add_child()
REMARK: at this point self.parent exists, but
self.parent.children doesn't contain self: i.e. the link
between child and parent only goes from the child to the parent
next_children:
list of NodeTree objects to substitute self in the tree.
Returns:
Nothing is returned.
Raises:
Nothing is raised.

Definition at line 178 of file NodeTree.py.

5.11.3.11 undeform()

```
def pkg.tree_core.NodeTree.NodeTree.undeform (
    self )
```

Undeforms the structure, as defined by self.deformingComps.

Args:

nothing is taken
Returns:
nothing is returned
Raises:
nothing is raised

Definition at line 369 of file NodeTree.py.

5.11.4 Member Data Documentation

5.11.4.1 amount

```
pkg.tree_core.NodeTree.NodeTree.amount
```

Definition at line 4 of file NodeTree.py.

5.11.4.2 children

```
pkg.tree_core.NodeTree.NodeTree.children
```

Definition at line 7 of file NodeTree.py.

5.11.4.3 `deformingComps`

```
pkg.tree_core.NodeTree.NodeTree.deformingComps
```

Definition at line 12 of file NodeTree.py.

5.11.4.4 `deformingCrossComps`

```
pkg.tree_core.NodeTree.NodeTree.deformingCrossComps
```

Definition at line 14 of file NodeTree.py.

5.11.4.5 `isValid`

```
pkg.tree_core.NodeTree.NodeTree.isValid
```

Definition at line 8 of file NodeTree.py.

5.11.4.6 `keep`

```
pkg.tree_core.NodeTree.NodeTree.keep
```

Definition at line 9 of file NodeTree.py.

5.11.4.7 `movingComps`

```
pkg.tree_core.NodeTree.NodeTree.movingComps
```

Definition at line 13 of file NodeTree.py.

5.11.4.8 `movingCrossComps`

```
pkg.tree_core.NodeTree.NodeTree.movingCrossComps
```

Definition at line 15 of file NodeTree.py.

5.11.4.9 `parent`

```
pkg.tree_core.NodeTree.NodeTree.parent
```

Definition at line 6 of file NodeTree.py.

5.11.4.10 `stretchingCrossComps`

```
pkg.tree_core.NodeTree.NodeTree.stretchingCrossComps
```

Definition at line 16 of file NodeTree.py.

5.11.4.11 structure

```
pkg.tree_core.NodeTree.NodeTree.structure
```

Definition at line 5 of file NodeTree.py.

5.11.4.12 substitute

```
pkg.tree_core.NodeTree.NodeTree.substitute
```

Definition at line 10 of file NodeTree.py.

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

- [pkg/tree_core/NodeTree.py](#)

5.12 pkg.structure_core.Structure.Structure Class Reference

Public Member Functions

- def `__init__` (self, [listLoadpaths](#), [listCrossComponents](#)=None)
- def [draw](#) (self)
- def [task_one](#) (self)
- def [task_two](#) (self, blackbox)
- def [reset_connections_to_barrier_and_firewall](#) (self)
- def [get_deforming_components](#) (self)

Public Attributes

- [listLoadpaths](#)
- [listCrossComponents](#)
- [listGaps](#)

5.12.1 Detailed Description

Groups all the entities of the topological model.

Definition at line 21 of file Structure.py.

5.12.2 Constructor & Destructor Documentation

5.12.2.1 `__init__()`

```
def pkg.structure_core.Structure.Structure.__init__ (
    self,
    listLoadpaths,
    listCrossComponents = None )
```

Constructor of the class `structure_core.structure.Structure`.

Args:

- `listLoadpaths`:
a list of `structure_core.loadpath.Loadpath` objects
- `listCrossComponents`:
`structure_core.cross_component.CrossComponent`

Returns:

- an object of the class.

Raises:

- nothing is raised.

Definition at line 24 of file `Structure.py`.

5.12.3 Member Function Documentation

5.12.3.1 `draw()`

```
def pkg.structure_core.Structure.Structure.draw (
    self )
```

Draws onto the screen the current state of the strucure (DEBUG purpose).

Args:

- nothing is taken

Returns:

- nothing is returned

Raises:

- nothing is raised.

Definition at line 44 of file `Structure.py`.

5.12.3.2 `get_deforming_components()`

```
def pkg.structure_core.Structure.Structure.get_deforming_components (
    self )
```

Return a list of deforming components tuples.

Returns a list of tuples. Each tuple contains the components to deform, one from every loadpath. There exists a tuple for every possible combination of components.

Args:

- nothing is taken

Returns:

- a list of tuples, e.g.:

```
[(comp1-lp1, comp1-lp2),
 (comp1-lp1, comp2-lp2),
 (comp2-lp1, comp1-lp2),
 (comp2-lp1, comp2-lp2),
 (comp3-lp1, comp1-lp2),
 (comp3-lp1, comp2-lp2)]
```

Raises:

- nothing is raised

Definition at line 220 of file `Structure.py`.

5.12.3.3 reset_connections_to_barrier_and_firewall()

```
def pkg.structure_core.Structure.Structure.reset_connections_to_barrier_and_firewall (
    self )
```

Updates the connections of components, cross components and nodes.

The attributes `.connectedToBarrier` and `.connectedToFirewall` of every `structure_core.Component` and `structure_core.CrossComponent` object are updated.

The attributes `.onBarrier` and `.onFirewall` of every `structure_core.Node` object are updated.

Args:

nothing is taken

Returns:

nothing is returned

Raises:

nothing is raised

Definition at line 166 of file `Structure.py`.

5.12.3.4 task_one()

```
def pkg.structure_core.Structure.Structure.task_one (
    self )
```

Finds all the Order of Deformation of the structure.

`self.task_one()` -> `[i_s, d_h]`.

Args:

nothing is taken

Returns:

`i_s`, a list of `isdh.component.Component` objects

`d_h`, a list of dictionaries such as:

```
{ isdh-comp1 : [DeformationStep1,
                DeformationStep2,
                ...],
  isdh-comp2 : [DeformationStep1,
                DeformationStep2,
                ...],
  isdh-comp3 : [DeformationStep1,
                DeformationStep2,
                ...],
}
```

where the keys are the elements of `i_s` and the values are lists of `isdh.deformation_step.DeformationStep` objects.

Raises:

nothing is raised.

Definition at line 70 of file `Structure.py`.

5.12.3.5 task_two()

```
def pkg.structure_core.Structure.Structure.task_two (
    self,
    blackbox )
```

Finds the physical Order of Deformation of the structure.

self.task_one() -> [i_s, d_h].

Args:

blackbox:

a function that decides whether the activeNode of the tree of the structure is the valid next deformationStep or not.

Returns:

i_s, a list of isdh.component.Component objects

d_h, a list with one dictionary such as:

```
{ isdh-comp1 : [DeformationStep1,
                DeformationStep2,
                ...],
  isdh-comp2 : [DeformationStep1,
                DeformationStep2,
                ...],
  isdh-comp3 : [DeformationStep1,
                DeformationStep2,
                ...],
}
```

where the keys are the elements of i_s and the values are lists of isdh.deformation_step.DeformationStep objects.

Raises:

exceptions raised by the blackbox, remain unhandled.

Definition at line 121 of file Structure.py.

5.12.4 Member Data Documentation

5.12.4.1 listCrossComponents

```
pkg.structure_core.Structure.Structure.listCrossComponents
```

Definition at line 38 of file Structure.py.

5.12.4.2 listGaps

```
pkg.structure_core.Structure.Structure.listGaps
```

Definition at line 40 of file Structure.py.

5.12.4.3 listLoadpaths

```
pkg.structure_core.Structure.Structure.listLoadpaths
```

Definition at line 37 of file Structure.py.

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

- pkg/structure_core/[Structure.py](#)

5.13 pkg.tree_core.tree.Tree Class Reference

Public Member Functions

- def `__init__` (self, `structure`)
- def `__repr__` (self)
- def `print` (self)
- def `add_children` (self)
- def `end` (self)
- def `go_down` (self)
- def `go_up` (self)
- def `go_right` (self)
- def `deform` (self)
- def `undeform` (self)
- def `surf` (self, `blackbox`)

Public Attributes

- `root`
- `activeNode`
- `structure`
- `savers`

5.13.1 Detailed Description

Definition at line 4 of file tree.py.

5.13.2 Constructor & Destructor Documentation

5.13.2.1 `__init__()`

```
def pkg.tree_core.tree.Tree.__init__ (
    self,
    structure )
```

Constructor of the class tree_core.Tree.

Args:
 structure:
the structure_core.Structure object to which the tree is linked
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 5 of file tree.py.

5.13.3 Member Function Documentation

5.13.3.1 `__repr__()`

```
def pkg.tree_core.tree.Tree.__repr__ (
    self )
```

Return the string representation of the object.

If the `activeNode` attribute is defined, its string representation is returned. Otherwise "Tree obj" is returned.

Args:
 nothing is taken
Returns:
 string
Raises:
 nothing is raised

Definition at line 27 of file `tree.py`.

5.13.3.2 `add_children()`

```
def pkg.tree_core.tree.Tree.add_children (
    self )
```

Add children to `self.activeNode`.

The children of `self.activeNode` are generated and appended to the list `self.activeNode.children`.
If the end of the tree as been reached (no valid child has been found), the current Order of Deformation is saved.

Args:
 nothing is taken
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 76 of file `tree.py`.

5.13.3.3 `deform()`

```
def pkg.tree_core.tree.Tree.deform (
    self )
```

Deforms the structure according to the active node.

The deformationSteps that occur as a consequence are saved by the savers.

Args:
 nothing is taken
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 203 of file `tree.py`.

5.13.3.4 end()

```
def pkg.tree_core.tree.Tree.end (
    self )

end() -> True or False.

Args:
    nothing is taken
Returns:
    True if self.activeNode has any valid children,
    False otherwise
Raises:
    Nothing is raised
```

Definition at line 111 of file tree.py.

5.13.3.5 go_down()

```
def pkg.tree_core.tree.Tree.go_down (
    self )

Changes the activeNode to its first valid child.

If there isn't any valid child, the activeNode is the rightest child
and the function raises a StopIteration error.

Args:
    nothing is taken
Returns:
    nothing is returned
Raises:
    StopIteration
```

Definition at line 129 of file tree.py.

5.13.3.6 go_right()

```
def pkg.tree_core.tree.Tree.go_right (
    self )

Changes the activeNode to its right neighbour.

If the neighbour doesn't exist, a StopIteration exception is raised.

Args:
    nothing is taken
Returns:
    nothing is returned
Raises:
    StopIteration
```

Definition at line 181 of file tree.py.

5.13.3.7 go_up()

```
def pkg.tree_core.tree.Tree.go_up (
    self )
```

Changes the activeNode to its parent.

The parent becomes the activeNode and the structure is consistently undeformed restoring the state before the deformation of self.

Args:
 nothing is taken
Returns:
 nothing is returned
Raises:
 Nothing is raised

Definition at line 159 of file tree.py.

5.13.3.8 print()

```
def pkg.tree_core.tree.Tree.print (
    self )
```

Print in detail the current Order of Deformation, as saved.

The dictionary self.savers[0].ood contains, for each component, the list of isdh.DeformationStep objects from the tree root to self.activeNode.

```
self.savers[0].ood = { isdh-comp1 : [DeformationStep1,
                                   DeformationStep2,
                                   ...],
                      isdh-comp2 : [DeformationStep1,
                                   DeformationStep2,
                                   ...],
                      isdh-comp3 : [DeformationStep1,
                                   DeformationStep2,
                                   ...],
                      }
```

The content of this dictionary is printed in detail.

Args:
 nothing is taken
Returns:
 nothing is returned
Raises:
 nothing is raised

Definition at line 45 of file tree.py.

5.13.3.9 surf()

```
def pkg.tree_core.tree.Tree.surf (
    self,
    blackbox )
```


Changes the activeNode.

It surfs the tree going down or right according to the blackbox response.

Args:

 blackbox:

a function that decides whether self.activeNode is the valid next deformationStep or not.

Returns:

 True, if self.activeNode or one of its neighbours was the correct one.

 False, if neither self.activeNode nor one of its neighbours was the correct one.

Raises:

 exceptions raised by the blackbox, remain unhandled.

Definition at line 249 of file tree.py.

5.13.3.10 undeform()

```
def pkg.tree_core.tree.Tree.undeform (
    self )
```

Undeforms the structure according to the active node.

The deformationSteps that are undone as a consequence are unsaved by the savers.

Args:

 nothing is taken

Returns:

 nothing is returned

Raises:

 nothing is raised

Definition at line 227 of file tree.py.

5.13.4 Member Data Documentation

5.13.4.1 activeNode

pkg.tree_core.tree.Tree.activeNode

Definition at line 17 of file tree.py.

5.13.4.2 root

pkg.tree_core.tree.Tree.root

Definition at line 16 of file tree.py.

5.13.4.3 savers

`pkg.tree_core.tree.Tree.savers`

Definition at line 19 of file tree.py.

5.13.4.4 structure

`pkg.tree_core.tree.Tree.structure`

Definition at line 18 of file tree.py.

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

- [pkg/tree_core/tree.py](#)

Chapter 6

File Documentation

6.1 pkg/__init__.py File Reference

Namespaces

- [pkg](#)

6.2 pkg/isdh/__init__.py File Reference

Namespaces

- [pkg.isdh](#)

6.3 pkg/structure_core/__init__.py File Reference

Namespaces

- [pkg.structure_core](#)

6.4 pkg/tree_core/__init__.py File Reference

Namespaces

- [pkg.tree_core](#)

6.5 Visualization/__init__.py File Reference

Namespaces

- [Visualization](#)

6.6 pkg/isdh/component.py File Reference

Classes

- class [pkg.isdh.component.Component](#)

Namespaces

- [pkg.isdh.component](#)

6.7 pkg/structure_core/Component.py File Reference

Classes

- class [pkg.structure_core.Component.Component](#)

Namespaces

- [pkg.structure_core.Component](#)

Variables

- [pkg.structure_core.Component.logger](#) = logging.getLogger('component')
- [pkg.structure_core.Component.level](#)
- tuple [pkg.structure_core.Component.BLACK](#) = (0, 0, 0)
- tuple [pkg.structure_core.Component.WHITE](#) = (255, 255, 255)
- tuple [pkg.structure_core.Component.RED](#) = (255, 0, 0)
- tuple [pkg.structure_core.Component.GREEN](#) = (0, 255, 0)
- tuple [pkg.structure_core.Component.BLUE](#) = (0, 0, 255)
- tuple [pkg.structure_core.Component.LIGHT_BLUE](#) = (102, 255, 255)
- tuple [pkg.structure_core.Component.DARK_GREEN](#) = (0, 100, 0)

6.8 pkg/isdh/deformation_step.py File Reference

Classes

- class [pkg.isdh.deformation_step.DeformationStep](#)

Namespaces

- [pkg.isdh.deformation_step](#)

Functions

- def [pkg.isdh.deformation_step.__repr__](#) (self)

LEGEND:

'd': the element deforms

'm': the element moves

'b': the element breaks

- def [pkg.isdh.deformation_step.__eq__](#) (self, other)
- def [pkg.isdh.deformation_step.__ne__](#) (self, other)
- def [pkg.isdh.deformation_step.print](#) (self)

Variables

- [pkg.isdh.deformation_step.transformation](#)

6.9 pkg/isdh/example_main.py File Reference

Namespaces

- [pkg.isdh.example_main](#)

Variables

- [pkg.isdh.example_main.structure](#) = [s.read_xml](#)('some_folder/my_xml_file.xml')
- int [pkg.isdh.example_main.n](#) = 0
solve the structure
- [pkg.isdh.example_main.frames_per_mm](#)

6.10 pkg/isdh/isdh_helper.py File Reference

Classes

- class [pkg.isdh.isdh_helper.IsdhHelper](#)

Namespaces

- [pkg.isdh.isdh_helper](#)

6.11 pkg/read_xml.py File Reference

Namespaces

- [pkg.read_xml](#)

Functions

- def [pkg.read_xml.read_xml](#) (path)
- def [pkg.read_xml.add_nodes](#) (root, struct)
- def [pkg.read_xml.add_components](#) (root, struct)
- def [pkg.read_xml.gaps_insertor](#) (structure)
- def [pkg.read_xml.gap_name](#) (level)
- def [pkg.read_xml.init_firewall_and_barrier](#) (structure)

Variables

- [pkg.read_xml.node](#)
add gaps in front of the loadpath
- [pkg.read_xml.frontNode](#)
- [pkg.read_xml.gap](#) = Component. \
- [pkg.read_xml.name](#) = gap_name(loadpath.level)
add gaps between components create a gap_name iterator (e.g.
- [pkg.read_xml.listNodes](#) = list(loadpath.setNodes)
- [pkg.read_xml.key](#)
- [pkg.read_xml.nodes](#)
- [pkg.read_xml.next_nodes](#)
- [pkg.read_xml.ignore_me](#) = next(next_nodes)
- list [pkg.read_xml.lp_levels](#)
- [pkg.read_xml.rightLimit](#)
- [pkg.read_xml.backNode](#)

6.12 pkg/structure_core/CrossComponent.py File Reference

Classes

- class [pkg.structure_core.CrossComponent.CrossComponent](#)

Namespaces

- [pkg.structure_core.CrossComponent](#)

Variables

- [pkg.structure_core.CrossComponent.logger](#) = logging.getLogger('CrossComponentLogger')
- tuple [pkg.structure_core.CrossComponent.BLACK](#) = (0, 0, 0)
- tuple [pkg.structure_core.CrossComponent.WHITE](#) = (255, 255, 255)
- tuple [pkg.structure_core.CrossComponent.RED](#) = (255, 0, 0)
- tuple [pkg.structure_core.CrossComponent.GREEN](#) = (0, 255, 0)
- tuple [pkg.structure_core.CrossComponent.BLUE](#) = (0, 0, 255)
- tuple [pkg.structure_core.CrossComponent.DARK_GREEN](#) = (0, 100, 0)

6.13 pkg/structure_core/Loadpath.py File Reference

Classes

- class [pkg.structure_core.Loadpath.Loadpath](#)

Namespaces

- [pkg.structure_core.Loadpath](#)

Functions

- def [pkg.structure_core.Loadpath.valid_components](#) (self)
*def add_member(self, component): *"""Function addes components to the list of components """* self.list←
Components.append(component)*

6.14 pkg/structure_core/Node.py File Reference

Classes

- class [pkg.structure_core.Node.Node](#)

Namespaces

- [pkg.structure_core.Node](#)

Variables

- tuple [pkg.structure_core.Node.BLACK](#) = (0, 0, 0)
- tuple [pkg.structure_core.Node.RED](#) = (255, 0, 0)
- tuple [pkg.structure_core.Node.DARK_GREEN](#) = (0, 100, 0)
- [pkg.structure_core.Node.logger](#) = logging.getLogger('node')
- [pkg.structure_core.Node.level](#)

6.15 pkg/structure_core/Structure.py File Reference

Classes

- class [pkg.structure_core.Structure.Structure](#)

Namespaces

- [pkg.structure_core.Structure](#)

Variables

- bool [pkg.structure_core.Structure.DEBUG](#) = False
import itertools from ..tree_core.tree import Tree from .
- bool [pkg.structure_core.Structure.STEPWISE](#) = False
- list [pkg.structure_core.Structure.size](#) = [1500, 500]
- [pkg.structure_core.Structure.screen](#) = pygame.display.set_mode(size)
- tuple [pkg.structure_core.Structure.BLACK](#) = (0, 0, 0)
- tuple [pkg.structure_core.Structure.WHITE](#) = (255, 255, 255)
- tuple [pkg.structure_core.Structure.RED](#) = (255, 0, 0)
- tuple [pkg.structure_core.Structure.GREEN](#) = (0, 255, 0)
- tuple [pkg.structure_core.Structure.BLUE](#) = (0, 0, 255)

6.16 pkg/tree_core/NodeTree.py File Reference

Classes

- class [pkg.tree_core.NodeTree.NodeTree](#)

Namespaces

- [pkg.tree_core.NodeTree](#)

6.17 pkg/tree_core/tree.py File Reference

Classes

- class [pkg.tree_core.tree.Tree](#)

Namespaces

- [pkg.tree_core.tree](#)

Variables

- bool [pkg.tree_core.tree.PRINT](#) = False

6.18 pkg/write_xml.py File Reference

Namespaces

- [pkg.write_xml](#)

Functions

- def [pkg.write_xml.create_level](#) (root, index)
- def [pkg.write_xml.create_component](#) (level, input_name, input_x1, input_x2, input_defoLength, input_end↵_lp=None)
- def [pkg.write_xml.ask_for_new_level](#) (root)
- def [pkg.write_xml.ask_for_new_member](#) (level, lp_i)
- def [pkg.write_xml.ask_for_new_connection](#) (level, lp_i)
- def [pkg.write_xml.prettify](#) (path)
- def [pkg.write_xml.new_xml](#) ()

6.19 Visualization/BlenderObject.py File Reference

Classes

- class [Visualization.BlenderObject.BlenderObject](#)

Namespaces

- [Visualization.BlenderObject](#)

Variables

- [Visualization.BlenderObject.meshElement](#) = bpy.ops.mesh.primitive_cube_add
- [Visualization.BlenderObject.meshMass](#) = bpy.ops.mesh.primitive_uv_sphere_add
- [Visualization.BlenderObject.meshText](#) = bpy.ops.object.text_add

6.20 Visualization/CreateVideo.py File Reference

Classes

- class [Visualization.CreateVideo.CreateVideo](#)

Namespaces

- [Visualization.CreateVideo](#)

6.21 Visualization/initialization.py File Reference

Namespaces

- [Visualization.initialization](#)

Functions

- def [Visualization.initialization.initialize](#) ()
- def [Visualization.initialization.static_numberOfElement](#) ()

6.22 Visualization/Member.py File Reference

Classes

- class [Visualization.Member.generalMember](#)

Namespaces

- [Visualization.Member](#)

6.23 Visualization/setCamera.py File Reference

Namespaces

- [Visualization.setCamera](#)

Functions

- def [Visualization.setCamera.setCamera](#) (scene, x, y, z, lents)

6.24 Visualization/setColor.py File Reference

Namespaces

- [Visualization.setColor](#)

Functions

- def [Visualization.setColor.setColor](#) (ob, color)
- def [Visualization.setColor.makeColor](#) (name, diffuse)

Variables

- def [Visualization.setColor.red](#) = makeColor('Red', (1,0,0))
- def [Visualization.setColor.blue](#) = makeColor('Blue', (0,0,1))
- def [Visualization.setColor.black](#) = makeColor('Black', (0,0,0))
- def [Visualization.setColor.white](#) = makeColor('White', (1,1,1))
- def [Visualization.setColor.green](#) = makeColor('Green', (0,1,0))
- def [Visualization.setColor.gray](#) = makeColor('Gray', (0.6,0.6,0.6))
- def [Visualization.setColor.dark_gray](#) = makeColor('Gray', (0.2,0.2,0.2))

6.25 Visualization/setFunction.py File Reference

Namespaces

- [Visualization.setFunction](#)

Functions

- def [Visualization.setFunction.movement](#) (object, initialFrame, finalFrame, amount, offset=0)
- def [Visualization.setFunction.rotation](#) (object, initialFrame, finalFrame, amount)
- def [Visualization.setFunction.deformation](#) (object, initialFrame, finalFrame, amount)
- def [Visualization.setFunction.color](#) (object, initialFrame, color)
- def [Visualization.setFunction.elimination](#) (object, initialFrame, finalFrame)
- def [Visualization.setFunction.interpolation](#) (object)

6.26 Visualization/setLamp.py File Reference

Namespaces

- [Visualization.setLamp](#)

Functions

- def [Visualization.setLamp.setLamp](#) (scene, x, y, z)

6.27 Visualization/setRender.py File Reference

Namespaces

- [Visualization.setRender](#)

Functions

- def [Visualization.setRender.Parameters](#) (numberOfFrames, resolution, locationWall, locationBackground, width, height, pathDirectory)

Index

- `__eq__`
 - `pkg::isdh::deformation_step`, 8
 - `pkg::structure_core::Node::Node`, 64
 - `__hash__`
 - `pkg::structure_core::Node::Node`, 64
 - `__init__`
 - `pkg::isdh::component::Component`, 38
 - `pkg::isdh::deformation_step::DeformationStep`, 51
 - `pkg::isdh::isdh_helper::IsdhHelper`, 58
 - `pkg::structure_core::Component::Component`, 41
 - `pkg::structure_core::CrossComponent::CrossComponent`, 46
 - `pkg::structure_core::Loadpath::Loadpath`, 62
 - `pkg::structure_core::Node::Node`, 64
 - `pkg::structure_core::Structure::Structure`, 74
 - `pkg::tree_core::NodeTree::NodeTree`, 67
 - `pkg::tree_core::tree::Tree`, 77
 - `Visualization::BlenderObject::BlenderObject`, 35
 - `Visualization::CreateVideo::CreateVideo`, 45
 - `Visualization::Member::generalMember`, 53
 - `__ne__`
 - `pkg::isdh::deformation_step`, 8
 - `__repr__`
 - `pkg::isdh::component::Component`, 38
 - `pkg::isdh::deformation_step`, 8
 - `pkg::structure_core::Component::Component`, 41
 - `pkg::structure_core::CrossComponent::CrossComponent`, 47
 - `pkg::structure_core::Node::Node`, 64
 - `pkg::tree_core::NodeTree::NodeTree`, 67
 - `pkg::tree_core::tree::Tree`, 78
 - `Visualization::Member::generalMember`, 53
- `activeNode`
 - `pkg::tree_core::tree::Tree`, 81
- `add_child`
 - `pkg::tree_core::NodeTree::NodeTree`, 67
- `add_children`
 - `pkg::tree_core::tree::Tree`, 78
- `add_components`
 - `pkg::read_xml`, 11
- `add_nodes`
 - `pkg::read_xml`, 11
- `amount`
 - `pkg::isdh::deformation_step::DeformationStep`, 51
 - `pkg::isdh::isdh_helper::IsdhHelper`, 61
 - `pkg::tree_core::NodeTree::NodeTree`, 71
- `angle`
 - `Visualization::Member::generalMember`, 55
- `ask_for_new_connection`
 - `pkg::write_xml`, 23
- `ask_for_new_level`
 - `pkg::write_xml`, 23
- `ask_for_new_member`
 - `pkg::write_xml`, 23
- BLACK
 - `pkg::structure_core::Component`, 16
 - `pkg::structure_core::CrossComponent`, 18
 - `pkg::structure_core::Node`, 20
 - `pkg::structure_core::Structure`, 21
- BLUE
 - `pkg::structure_core::Component`, 16
 - `pkg::structure_core::CrossComponent`, 18
 - `pkg::structure_core::Structure`, 21
- `backNode`
 - `pkg::read_xml`, 14
- `black`
 - `Visualization::setColor`, 28
- `blue`
 - `Visualization::setColor`, 28
- `breakable`
 - `pkg::structure_core::CrossComponent::CrossComponent`, 50
- `broken`
 - `pkg::structure_core::CrossComponent::CrossComponent`, 50
- `change_position`
 - `pkg::structure_core::Node::Node`, 64
- `check_amount`
 - `pkg::tree_core::NodeTree::NodeTree`, 68
- `check_keep_deforming`
 - `pkg::tree_core::NodeTree::NodeTree`, 68
- `children`
 - `pkg::tree_core::NodeTree::NodeTree`, 71
- `color`
 - `Visualization::BlenderObject::BlenderObject`, 36
 - `Visualization::setFunction`, 30
- `connectedToBarrier`
 - `pkg::structure_core::Component::Component`, 44
 - `pkg::structure_core::CrossComponent::CrossComponent`, 50
- `connectedToFirewall`
 - `pkg::structure_core::Component::Component`, 44
 - `pkg::structure_core::CrossComponent::CrossComponent`, 50
- `copy_ood`
 - `pkg::isdh::isdh_helper::IsdhHelper`, 58
- `create_component`

- pkg::write_xml, 24
- create_level
 - pkg::write_xml, 24
- cross_components_amount
 - pkg::tree_core::NodeTree::NodeTree, 69
- d_h
 - pkg::isdh::isdh_helper::IsdhHelper, 61
- d_print
 - pkg::tree_core::NodeTree::NodeTree, 69
- DARK_GREEN
 - pkg::structure_core::Component, 17
 - pkg::structure_core::CrossComponent, 18
 - pkg::structure_core::Node, 20
- DEBUG
 - pkg::structure_core::Structure, 21
- dark_gray
 - Visualization::setColor, 29
- defo_length
 - pkg::isdh::component::Component, 39
- deform
 - pkg::tree_core::NodeTree::NodeTree, 69
 - pkg::tree_core::tree::Tree, 78
 - Visualization::Member::generalMember, 53
- deformPart
 - Visualization::Member::generalMember, 55
- deformable_length
 - pkg::structure_core::Component::Component, 41
 - pkg::structure_core::CrossComponent::CrossComponent, 47
- deformation
 - Visualization::setFunction, 30
- deformingComps
 - pkg::tree_core::NodeTree::NodeTree, 71
- deformingCrossComps
 - pkg::tree_core::NodeTree::NodeTree, 72
- determine_amount
 - pkg::tree_core::NodeTree::NodeTree, 70
- dimension
 - Visualization::BlenderObject::BlenderObject, 36
- dL
 - Visualization::Member::generalMember, 55
- draw
 - pkg::structure_core::Component::Component, 41
 - pkg::structure_core::CrossComponent::CrossComponent, 47
 - pkg::structure_core::Node::Node, 65
 - pkg::structure_core::Structure::Structure, 74
- dX
 - Visualization::Member::generalMember, 55
- dY
 - Visualization::Member::generalMember, 55
- elementSize
 - Visualization::Member::generalMember, 55
- elimination
 - Visualization::setFunction, 30
- end
 - pkg::tree_core::tree::Tree, 78
- frame_begin
 - pkg::isdh::deformation_step::DeformationStep, 51
- frame_end
 - pkg::isdh::deformation_step::DeformationStep, 52
- frames_per_mm
 - pkg::isdh::example_main, 10
- frontNode
 - pkg::read_xml, 14
- GREEN
 - pkg::structure_core::Component, 17
 - pkg::structure_core::CrossComponent, 18
 - pkg::structure_core::Structure, 21
- gap
 - pkg::read_xml, 14
- gap_name
 - pkg::read_xml, 12
- gaps_inserter
 - pkg::read_xml, 12
- get_deforming_components
 - pkg::structure_core::Structure::Structure, 74
- get_geometricalObject
 - Visualization::BlenderObject::BlenderObject, 36
- go_down
 - pkg::tree_core::tree::Tree, 79
- go_right
 - pkg::tree_core::tree::Tree, 79
- go_up
 - pkg::tree_core::tree::Tree, 79
- gray
 - Visualization::setColor, 29
- green
 - Visualization::setColor, 29
- i_s
 - pkg::isdh::isdh_helper::IsdhHelper, 61
- ignore_me
 - pkg::read_xml, 14
- init_firewall_and_barrier
 - pkg::read_xml, 13
- init_ood
 - pkg::isdh::isdh_helper::IsdhHelper, 58
- initialize
 - Visualization::initialization, 26
- interpolation
 - Visualization::setFunction, 31
- is_valid
 - pkg::structure_core::CrossComponent::CrossComponent, 47
- isGap
 - pkg::structure_core::Component::Component, 44
- isValid
 - pkg::tree_core::NodeTree::NodeTree, 72
- isdh_dict
 - pkg::isdh::isdh_helper::IsdhHelper, 61
- keep
 - pkg::tree_core::NodeTree::NodeTree, 72
- key

- pkg::read_xml, 14
- l1
 - Visualization::Member::generalMember, 55
- l2
 - Visualization::Member::generalMember, 56
- LIGHT_BLUE
 - pkg::structure_core::Component, 17
- lNode
 - Visualization::Member::generalMember, 56
- left_deforms
 - pkg::structure_core::CrossComponent::CrossComponent, 48
- leftNode
 - pkg::structure_core::Component::Component, 44
 - pkg::structure_core::CrossComponent::CrossComponent, 50
- length
 - pkg::structure_core::Component::Component, 42
 - pkg::structure_core::CrossComponent::CrossComponent, 48
- level
 - pkg::structure_core::Component, 17
 - pkg::structure_core::Loadpath::Loadpath, 63
 - pkg::structure_core::Node, 20
- link_to_barrier
 - pkg::structure_core::Component::Component, 42
 - pkg::structure_core::CrossComponent::CrossComponent, 48
- link_to_firewall
 - pkg::structure_core::Component::Component, 42
 - pkg::structure_core::CrossComponent::CrossComponent, 49
- listComponents
 - pkg::structure_core::Loadpath::Loadpath, 63
- listCrossComponents
 - pkg::structure_core::Structure::Structure, 76
- listGaps
 - pkg::structure_core::Structure::Structure, 76
- listLoadpaths
 - pkg::structure_core::Structure::Structure, 76
- listNodes
 - pkg::read_xml, 14
- loadpathLevel
 - pkg::structure_core::Node::Node, 65
- location
 - Visualization::BlenderObject::BlenderObject, 36
- logger
 - pkg::structure_core::Component, 17
 - pkg::structure_core::CrossComponent, 18
 - pkg::structure_core::Node, 20
- lp_level1
 - pkg::isdh::component::Component, 39
- lp_level2
 - pkg::isdh::component::Component, 39
- lp_levels
 - pkg::read_xml, 14
- makeColor
 - Visualization::setColor, 28
- mass
 - pkg::isdh::component::Component, 39
 - Visualization::Member::generalMember, 56
- mass_position
 - pkg::isdh::component::Component, 39
 - Visualization::Member::generalMember, 56
- meshElement
 - Visualization::BlenderObject, 25
- meshMass
 - Visualization::BlenderObject, 25
- meshText
 - Visualization::BlenderObject, 25
- move
 - Visualization::Member::generalMember, 54
- movement
 - Visualization::setFunction, 31
- moves
 - pkg::structure_core::Component::Component, 43
- movingComps
 - pkg::tree_core::NodeTree::NodeTree, 72
- movingCrossComps
 - pkg::tree_core::NodeTree::NodeTree, 72
- n
 - pkg::isdh::example_main, 10
- name
 - pkg::isdh::component::Component, 39
 - pkg::read_xml, 15
 - pkg::structure_core::Component::Component, 44
 - pkg::structure_core::CrossComponent::CrossComponent, 50
 - Visualization::BlenderObject::BlenderObject, 37
- new_xml
 - pkg::write_xml, 24
- next_children
 - pkg::tree_core::NodeTree::NodeTree, 70
- next_gap
 - pkg::structure_core::Component::Component, 43
- next_nodes
 - pkg::read_xml, 15
- node
 - pkg::read_xml, 15
- nodes
 - pkg::read_xml, 15
- nonDeformPart
 - Visualization::Member::generalMember, 56
- obj
 - Visualization::BlenderObject::BlenderObject, 37
- object
 - Visualization::BlenderObject::BlenderObject, 37
- onBarrier
 - pkg::structure_core::Node::Node, 65
- onFirewall
 - pkg::structure_core::Node::Node, 65
- ood
 - pkg::isdh::isdh_helper::IsdhHelper, 61

PRINT
 pkg::tree_core::tree, 23
 Parameters
 Visualization::setRender, 33
 parent
 pkg::tree_core::NodeTree::NodeTree, 72
 pkg, 7
 pkg.isdh, 7
 pkg.isdh.component, 7
 pkg.isdh.component.Component, 37
 pkg.isdh.deformation_step, 7
 pkg.isdh.deformation_step.DeformationStep, 51
 pkg.isdh.example_main, 10
 pkg.isdh.isdh_helper, 11
 pkg.isdh.isdh_helper.IsdhHelper, 58
 pkg.read_xml, 11
 pkg.structure_core, 16
 pkg.structure_core.Component, 16
 pkg.structure_core.Component.Component, 40
 pkg.structure_core.CrossComponent, 18
 pkg.structure_core.CrossComponent.CrossComponent, 46
 pkg.structure_core.Loadpath, 19
 pkg.structure_core.Loadpath.Loadpath, 62
 pkg.structure_core.Node, 20
 pkg.structure_core.Node.Node, 63
 pkg.structure_core.Structure, 21
 pkg.structure_core.Structure.Structure, 73
 pkg.tree_core, 22
 pkg.tree_core.NodeTree, 22
 pkg.tree_core.NodeTree.NodeTree, 66
 pkg.tree_core.tree, 23
 pkg.tree_core.tree.Tree, 77
 pkg.write_xml, 23
 pkg/___init__.py, 83
 pkg/isdh/___init__.py, 83
 pkg/isdh/component.py, 84
 pkg/isdh/deformation_step.py, 84
 pkg/isdh/example_main.py, 85
 pkg/isdh/isdh_helper.py, 85
 pkg/read_xml.py, 85
 pkg/structure_core/___init__.py, 83
 pkg/structure_core/Component.py, 84
 pkg/structure_core/CrossComponent.py, 86
 pkg/structure_core/Loadpath.py, 87
 pkg/structure_core/Node.py, 87
 pkg/structure_core/Structure.py, 87
 pkg/tree_core/___init__.py, 83
 pkg/tree_core/NodeTree.py, 88
 pkg/tree_core/tree.py, 88
 pkg::isdh::component::Component
 __init__, 38
 __repr__, 38
 defo_length, 39
 lp_level1, 39
 lp_level2, 39
 mass, 39
 mass_position, 39
 name, 39
 x1, 39
 x2, 39
 pkg::isdh::deformation_step
 __eq__, 8
 __ne__, 8
 __repr__, 8
 print, 9
 transformation, 9
 pkg::isdh::deformation_step::DeformationStep
 __init__, 51
 amount, 51
 frame_begin, 51
 frame_end, 52
 transformation, 52
 pkg::isdh::example_main
 frames_per_mm, 10
 n, 10
 structure, 10
 pkg::isdh::isdh_helper::IsdhHelper
 __init__, 58
 amount, 61
 copy_ood, 58
 d_h, 61
 i_s, 61
 init_ood, 58
 isdh_dict, 61
 ood, 61
 register, 59
 save, 59
 save_defo_step, 59
 save_ood, 60
 unsave, 60
 update_amount, 60
 pkg::read_xml
 add_components, 11
 add_nodes, 11
 backNode, 14
 frontNode, 14
 gap, 14
 gap_name, 12
 gaps_insertor, 12
 ignore_me, 14
 init_firewall_and_barrier, 13
 key, 14
 listNodes, 14
 lp_levels, 14
 name, 15
 next_nodes, 15
 node, 15
 nodes, 15
 read_xml, 13
 rightLimit, 15
 pkg::structure_core::Component
 BLACK, 16
 BLUE, 16
 DARK_GREEN, 17

- GREEN, [17](#)
- LIGHT_BLUE, [17](#)
- level, [17](#)
- logger, [17](#)
- RED, [17](#)
- WHITE, [17](#)
- pkg::structure_core::Component::Component
 - __init__, [41](#)
 - __repr__, [41](#)
 - connectedToBarrier, [44](#)
 - connectedToFirewall, [44](#)
 - deformable_length, [41](#)
 - draw, [41](#)
 - isGap, [44](#)
 - leftNode, [44](#)
 - length, [42](#)
 - link_to_barrier, [42](#)
 - link_to_firewall, [42](#)
 - moves, [43](#)
 - name, [44](#)
 - next_gap, [43](#)
 - rightNode, [44](#)
 - rigidLength, [44](#)
- pkg::structure_core::CrossComponent
 - BLACK, [18](#)
 - BLUE, [18](#)
 - DARK_GREEN, [18](#)
 - GREEN, [18](#)
 - logger, [18](#)
 - RED, [18](#)
 - WHITE, [19](#)
- pkg::structure_core::CrossComponent::CrossComponent
 - __init__, [46](#)
 - __repr__, [47](#)
 - breakable, [50](#)
 - broken, [50](#)
 - connectedToBarrier, [50](#)
 - connectedToFirewall, [50](#)
 - deformable_length, [47](#)
 - draw, [47](#)
 - is_valid, [47](#)
 - left_deforms, [48](#)
 - leftNode, [50](#)
 - length, [48](#)
 - link_to_barrier, [48](#)
 - link_to_firewall, [49](#)
 - name, [50](#)
 - right_deforms, [49](#)
 - rightNode, [50](#)
 - rigidLength, [50](#)
- pkg::structure_core::Loadpath
 - valid_components, [19](#)
- pkg::structure_core::Loadpath::Loadpath
 - __init__, [62](#)
 - level, [63](#)
 - listComponents, [63](#)
 - setNodes, [63](#)
- pkg::structure_core::Node
 - BLACK, [20](#)
 - DARK_GREEN, [20](#)
 - level, [20](#)
 - logger, [20](#)
 - RED, [20](#)
- pkg::structure_core::Node::Node
 - __eq__, [64](#)
 - __hash__, [64](#)
 - __init__, [64](#)
 - __repr__, [64](#)
 - change_position, [64](#)
 - draw, [65](#)
 - loadpathLevel, [65](#)
 - onBarrier, [65](#)
 - onFirewall, [65](#)
 - position, [66](#)
 - towardsBarrier, [66](#)
 - towardsFirewall, [66](#)
- pkg::structure_core::Structure
 - BLACK, [21](#)
 - BLUE, [21](#)
 - DEBUG, [21](#)
 - GREEN, [21](#)
 - RED, [21](#)
 - STEPWISE, [22](#)
 - screen, [22](#)
 - size, [22](#)
 - WHITE, [22](#)
- pkg::structure_core::Structure::Structure
 - __init__, [74](#)
 - draw, [74](#)
 - get_deforming_components, [74](#)
 - listCrossComponents, [76](#)
 - listGaps, [76](#)
 - listLoadpaths, [76](#)
 - reset_connections_to_barrier_and_firewall, [74](#)
 - task_one, [75](#)
 - task_two, [75](#)
- pkg::tree_core::NodeTree::NodeTree
 - __init__, [67](#)
 - __repr__, [67](#)
 - add_child, [67](#)
 - amount, [71](#)
 - check_amount, [68](#)
 - check_keep_deforming, [68](#)
 - children, [71](#)
 - cross_components_amount, [69](#)
 - d_print, [69](#)
 - deform, [69](#)
 - deformingComps, [71](#)
 - deformingCrossComps, [72](#)
 - determine_amount, [70](#)
 - isValid, [72](#)
 - keep, [72](#)
 - movingComps, [72](#)
 - movingCrossComps, [72](#)
 - next_children, [70](#)
 - parent, [72](#)

- stretchingCrossComps, 72
- structure, 72
- substitute, 73
- substitute_children, 70
- undeform, 71
- pkg::tree_core::tree
 - PRINT, 23
- pkg::tree_core::tree::Tree
 - __init__, 77
 - __repr__, 78
 - activeNode, 81
 - add_children, 78
 - deform, 78
 - end, 78
 - go_down, 79
 - go_right, 79
 - go_up, 79
 - print, 80
 - root, 81
 - savers, 81
 - structure, 82
 - surf, 80
 - undeform, 81
- pkg::write_xml
 - ask_for_new_connection, 23
 - ask_for_new_level, 23
 - ask_for_new_member, 23
 - create_component, 24
 - create_level, 24
 - new_xml, 24
 - prettify, 24
- position
 - pkg::structure_core::Node::Node, 66
- prettify
 - pkg::write_xml, 24
- print
 - pkg::isdh::deformation_step, 9
 - pkg::tree_core::tree::Tree, 80
- rDL
 - Visualization::Member::generalMember, 56
- RED
 - pkg::structure_core::Component, 17
 - pkg::structure_core::CrossComponent, 18
 - pkg::structure_core::Node, 20
 - pkg::structure_core::Structure, 21
- rNode
 - Visualization::Member::generalMember, 56
- rPM
 - Visualization::Member::generalMember, 57
- rRL
 - Visualization::Member::generalMember, 57
- read_xml
 - pkg::read_xml, 13
- red
 - Visualization::setColor, 29
- register
 - pkg::isdh::isdh_helper::IsdhHelper, 59
- reset_connections_to_barrier_and_firewall
 - pkg::structure_core::Structure::Structure, 74
- right_deforms
 - pkg::structure_core::CrossComponent::CrossComponent, 49
- rightLimit
 - pkg::read_xml, 15
- rightNode
 - pkg::structure_core::Component::Component, 44
 - pkg::structure_core::CrossComponent::CrossComponent, 50
- rigidLength
 - pkg::structure_core::Component::Component, 44
 - pkg::structure_core::CrossComponent::CrossComponent, 50
- rL
 - Visualization::Member::generalMember, 56
- root
 - pkg::tree_core::tree::Tree, 81
- rotation
 - Visualization::BlenderObject::BlenderObject, 37
 - Visualization::setFunction, 32
- STEPWISE
 - pkg::structure_core::Structure, 22
- save
 - pkg::isdh::isdh_helper::IsdhHelper, 59
- save_defo_step
 - pkg::isdh::isdh_helper::IsdhHelper, 59
- save_ood
 - pkg::isdh::isdh_helper::IsdhHelper, 60
- savers
 - pkg::tree_core::tree::Tree, 81
- screen
 - pkg::structure_core::Structure, 22
- sep
 - Visualization::Member::generalMember, 57
- setCamera
 - Visualization::setCamera, 27
- setColor
 - Visualization::setColor, 28
- setLamp
 - Visualization::setLamp, 33
- setNodes
 - pkg::structure_core::Loadpath::Loadpath, 63
- size
 - pkg::structure_core::Structure, 22
- static_numberOfElement
 - Visualization::initialization, 26
- stretchingCrossComps
 - pkg::tree_core::NodeTree::NodeTree, 72
- structure
 - pkg::isdh::example_main, 10
 - pkg::tree_core::NodeTree::NodeTree, 72
 - pkg::tree_core::tree::Tree, 82
- substitute
 - pkg::tree_core::NodeTree::NodeTree, 73
- substitute_children
 - pkg::tree_core::NodeTree::NodeTree, 70
- surf

- pkg::tree_core::tree::Tree, 80
- tag
 - Visualization::Member::generalMember, 57
- task_one
 - pkg::structure_core::Structure::Structure, 75
- task_two
 - pkg::structure_core::Structure::Structure, 75
- totalLength
 - Visualization::Member::generalMember, 57
- towardsBarrier
 - pkg::structure_core::Node::Node, 66
- towardsFirewall
 - pkg::structure_core::Node::Node, 66
- transformation
 - pkg::isdh::deformation_step, 9
 - pkg::isdh::deformation_step::DeformationStep, 52
- type
 - Visualization::BlenderObject::BlenderObject, 37
- undeform
 - pkg::tree_core::NodeTree::NodeTree, 71
 - pkg::tree_core::tree::Tree, 81
- unsave
 - pkg::isdh::isdh_helper::IsdhHelper, 60
- update_amount
 - pkg::isdh::isdh_helper::IsdhHelper, 60
- valid_components
 - pkg::structure_core::Loadpath, 19
- Visualization, 24
- Visualization.BlenderObject, 25
- Visualization.BlenderObject.BlenderObject, 35
- Visualization.CreateVideo, 25
- Visualization.CreateVideo.CreateVideo, 45
- Visualization.initialization, 25
- Visualization.Member, 26
- Visualization.Member.generalMember, 52
- Visualization.setCamera, 26
- Visualization.setColor, 27
- Visualization.setFunction, 29
- Visualization.setLamp, 32
- Visualization.setRender, 33
- Visualization/___init__.py, 83
- Visualization/BlenderObject.py, 89
- Visualization/CreateVideo.py, 89
- Visualization/Member.py, 90
- Visualization/initialization.py, 89
- Visualization/setCamera.py, 90
- Visualization/setColor.py, 90
- Visualization/setFunction.py, 91
- Visualization/setLamp.py, 91
- Visualization/setRender.py, 91
- Visualization::BlenderObject
 - meshElement, 25
 - meshMass, 25
 - meshText, 25
- Visualization::BlenderObject::BlenderObject
 - ___init___, 35
 - color, 36
 - dimension, 36
 - get_geometricalObject, 36
 - location, 36
 - name, 37
 - obj, 37
 - object, 37
 - rotation, 37
 - type, 37
- Visualization::CreateVideo::CreateVideo
 - ___init___, 45
- Visualization::Member::generalMember
 - ___init___, 53
 - ___repr___, 53
 - angle, 55
 - deform, 53
 - deformPart, 55
 - dL, 55
 - dX, 55
 - dY, 55
 - elementSize, 55
 - I1, 55
 - I2, 56
 - INode, 56
 - mass, 56
 - mass_position, 56
 - move, 54
 - nonDeformPart, 56
 - rDL, 56
 - rNode, 56
 - rPM, 57
 - rRL, 57
 - rL, 56
 - sep, 57
 - tag, 57
 - totalLength, 57
- Visualization::initialization
 - initialize, 26
 - static_numberOfElement, 26
- Visualization::setCamera
 - setCamera, 27
- Visualization::setColor
 - black, 28
 - blue, 28
 - dark_gray, 29
 - gray, 29
 - green, 29
 - makeColor, 28
 - red, 29
 - setColor, 28
 - white, 29
- Visualization::setFunction
 - color, 30
 - deformation, 30
 - elimination, 30
 - interpolation, 31
 - movement, 31
 - rotation, 32

Visualization::setLamp

 setLamp, [33](#)

Visualization::setRender

 Parameters, [33](#)

WHITE

 pkg::structure_core::Component, [17](#)

 pkg::structure_core::CrossComponent, [19](#)

 pkg::structure_core::Structure, [22](#)

white

 Visualization::setColor, [29](#)

x1

 pkg::isdh::component::Component, [39](#)

x2

 pkg::isdh::component::Component, [39](#)