

## AdaptInfo

Parameters for AdaptInfo([name],nComponents)

keyword	data type	default	description
(name)->start time	double	[0.0]	Initial time
(name)->timestep	double	[0.0]	Time step size to be used
(name)->end time	double	[1.0]	Final time
(name)->max iteration	int	[-1]	maximal allowed number of iterations of the adaptive procedure; if max-Iteration $\leq 0$ , no iteration bound is used
(name)->max timestep iteration	int	[30]	Maximal number of iterations for choosing a timestep
(name)->max time iteration	int	[30]	Maximal number of time iterations
(name)->min timestep	double	[0.0]	Minimal step size
(name)->max timestep	double	[1.0]	Maximal step size
(name)->number of timesteps	int	[0]	Per default this value is 0 and not used. If it is set to a non-zero value, the computation of the stationary problem is done nTimesteps times with a fixed timestep.

Parameters for AdaptInfo for each component separately. (name):=(name)[i] for  $i = 0, \dots, \text{nComponents}-1$

keyword	data type	default	description
(name)[i]->tolerance	double	[0.0]	Tolerance for the (absolute or relative) error
(name)[i]->time tolerance	double	[0.0]	Time tolerance.
(name)[i]->coarsen allowed	int {0,1}	[0]	true if coarsening is allowed, false otherwise.
(name)[i]->refinement allowed	int {0,1}	[1]	true if refinement is allowed, false otherwise.
(name)[i]->refine bisections	int	[1]	parameter to tell the marking strategy how many bisections should be performed when an element is marked for refinement; usually the value is 1 or DIM
(name)[i]->coarsen bisections	int	[1]	parameter to tell the marking strategy how many bisections should be undone when an element is marked for coarsening; usually the value is 1 or DIM
(name)[i]->sum factor	double	[1.0]	factors to combine max and integral time estimate
(name)[i]->max factor	double	[0.0]	factors to combine max and integral time estimate

## AdaptInstationary

(name) ist the first argument of the constructor: AdaptInstationary((name),...)

keyword	data type	default	description
(name)->strategy	int	[0]	Strategy for choosing one timestep: strategy 0: Explicit strategy, strategy 1: Implicit strategy.

(name)->time delta 1	double	[0.7071]	Parameter $\delta_1$ used in time step reduction
(name)->time delta 2	double	[1.4142]	Parameter $\delta_2$ used in time step enlargement
(name)->info	int	[10]	Info level (from AdaptBase)
(name)->break when stable	int	[0]	If this parameter is 1 and the instationary problem is stable, hence the number of solver iterations to solve the problem is zero, the adaption loop will stop.
(name)->time adaptivity debug mode	bool	[0]	In debug mode, the adapt loop will print information about timestep decreasing and increasing.
(name)->queue->runtime	int	[-1]	Runtime of the queue (of the servers batch system) in seconds. If the problem runs on a computer/server without a time limited queue, the value is -1.
(name)->queue->serialization filename	string	[...serialized_problem.ser]	Name of the file used to automatically serialize the problem.

## AdaptStationary

(name) ist the first argument of the constructor: AdaptStationary((name),...)

keyword	data type	default	description
(name)->info	int	[10]	Info level (from AdaptBase)

## Estimator

Global Estimator Parameters

keyword	data type	default	description
(estimator)->error norm	enum {NO_NORM, L2_NORM, H1_NORM}	[NO_NORM]	Used norm

Parameters for the **RecoveryEstimator**

keyword	data type	default	description
(estimator)->rec method	int {0,1,2}	[0]	Recovery method: 0: superconvergent patch recovery (discrete ZZ), 1: local L2-averaging (continuous ZZ-recovery), 2: simple averaging
(estimator)->rel error	int {0,1}	[0]	
(estimator)->C	double	[1.0]	

Parameters for the **ResidualEstimator**

keyword	data type	default	description
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(estimator)->C0	double	[0.0]
(estimator)->C1	double	[0.0]
(estimator)->C2	double	[0.0]
(estimator)->C3	double	[0.0]

Parameters for the **SimpleResidualEstimator**

keyword	data type	default	description
(estimator)->C0	double	[0.0]	
(estimator)->C1	double	[0.0]	

## FileWriter

Parameters for Data output. Typically the label ist (name):=(problem-name)->output

keyword	data type	default	description
(problem-name)->output->filename	string	[]	Used filename prefix.
(problem-name)->output->AMDiS format	bool	[0]	0: Don't write AMDiS files; 1: Write AMDiS files.
(problem-name)->output->AMDiS mesh ext	string	[.mesh]	AMDiS mesh-file extension.
(problem-name)->output->AMDiS data ext	string	[.dat]	AMDiS solution-file extension.
(problem-name)->output->ParaView format	bool	[0]	0: Don't write ParaView files; 1: Write ParaView files.
(problem-name)->output->ParaView vector format	bool	[0]	0: Don't write ParaView vector files; 1: Write ParaView vector files.
(problem-name)->output->ParaView animation	bool	[0]	0: Don't write ParaView animation file; 1: Write ParaView animation file.
(problem-name)->output->ParaView ext	string	[.vtu]	VTK file extension.
(problem-name)->output->Periodic format	bool	[0]	0: Don't write periodic files; 1: Write periodic files.
(problem-name)->output->Periodic ext	string	[.per]	Periodic file extension.
(problem-name)->output->PNG format	bool	[0]	0: Don't write png files; 1: Write png image files.
(problem-name)->output->PNG type	int	[0]	0: Gray color picture; 1: RGB picture.
(problem-name)->output->append index	int	[0]	0: Don't append time index to filename prefix; 1: Append time index to filename prefix.
(problem-name)->output->index length	int	[5]	Total length of appended time index.
(problem-name)->output->index decimals	int	[3]	Number of decimals in time index.
(problem-name)->output->write every i-th timestep	int	[1]	Timestep modulo: write only every tsModulo-th timestep!
(problem-name)->output->Povray format	bool	[0]	0: Don't write Povray scripts; 1: Write Povray scripts
(problem-name)->output->Povray template	string	[]	name of the template file that will be prepended to all created *.pov files
(problem-name)->output->Povray camera location	string	[]	camera position for povray script files
(problem-name)->output->Povray camera look_at	string	[]	orientation for camera in povray script files
(problem-name)->output->DOF format	bool	[0]	0: Don't write DOF files; 1: Write DOF files
(problem-name)->output->ARH format	bool	[0]	0: Don't write ARH files; 1: Write ARH files

(problem-name)->output->compression	enum {gz, gzip, bz2, [] bzip2}
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## HL\_SignedDistTraverse

Reinitialization class HL\_SignedDistTraverse((name),...) with (name) as first argument in the constructor.

keyword	data type	default	description
(name)->tolerance	double	[]	Tolerance for Hopf-Lax update iteration loop.
(name)->maximal number of iteration steps	int	[]	Maximal number of mesh iterations for Hopf-Lax update.
(name)->Gauss-Seidel iteration	bool	[]	Indicates whether Gauss-Seidel or Jacobi iteration is used. 0: Jacobi, 1: Gauss-Seidel
(name)->infinity value	double	[]	Initialization value “infinity” for non-boundary vertices. Must be $> 1000$
(name)->boundary initialization	int	[]	Define boundary initialization strategy. 0: BoundaryElementLevelSetDist, 1: BoundaryElementTopDist, 2: BoundaryElementEdgeDist, 3: BoundaryElementNormalDist

## Marker

Global Marker Parameters

keyword	data type	default	description
(marker)->strategy	int {0-4}	[0]	0..no marker, 1..GRMarker, 2..MSMarker, 3..ESMarker, 4..GERSMarker
(marker)->p	int	[2]	power in estimator norm
(marker)->info	int	[10]	Info level
(marker)->max refinement level	int	[-1]	Maximal level of all elements
(marker)->min refinement level	int	[-1]	Minimal level of all elements

Parameters for the **ESMarker** (Equidistribution strategy [?])

keyword	data type	default	description
(marker)->ESTheta	double	[0.9]	Marking parameter $\theta$
(marker)->ESThetaC	double	[0.2]	Marking parameter $\theta_C$

Parameters for the **GERSMarker** (Guaranteed error reduction strategy [?])

keyword	data type	default	description
(marker)->GERSThetaStar	double	[0.6]	Marking parameter $\theta^*$
(marker)->GERSNu	double	[0.1]	Marking parameter $\nu$

(marker)->GERSThetaC	double	[0.1]	Marking parameter $\theta_C$
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Parameters for the **GRMarker** (Global refinement strategy)

keyword	data type	default	description
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Parameters for the **MSMarker** (Maximum strategy)

keyword	data type	default	description
(marker)->MSGamma	double	[0.5]	Marking parameter $\gamma$
(marker)->MSGammaC	double	[0.1]	Marking parameter $\gamma_C$

## Mesh

Mesh((name),.)

keyword	data type	default	description
(name)->macro file name	string	[]	Filename for the macrofile
(name)->value file name	string	[]	Filename for value file.
(name)->periodic file	string	[]	filename for periodic file
(name)->check	int	[1]	Check the mesh structure
(name)->preserve coarse dofs	bool	[0]	When an element is refined, not all dofs of the coarse element must be part of the new elements. An example are centered dofs when using higher lagrange basis functions. The midpoint dof of the parents element is not a dof of the both children elements. Therefore, the dof can be deleted. In some situation, e.g., when using multigrid techniques, it can be necessary to store this coarse dofs. Then this variable must be set to true. If false, the not required coarse dofs will be deleted.
(name)->macro weights	string	[]	file of file that contains weight number for each element. The higher the weigh, the more this element will be refined and thus more processors share this element.
(name)->global refinements	int	[0]	Number of global refinements

## Meshdistributor

The label (name) represents the string that is passed to the constructor of MeshDistributor.

keyword	data type	default	description
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(name)->repartitioning	bool	[0]	En/disables repartitioning of the macro mesh, when derivation of mean number of DOFs exceeds a threshold value.
(name)->repartition ith change	int	[20]	Sets number of mesh changes to wait before threshold check for repartitioning will be performed.
(name)->partitioner	enum {parmetis, zoltan, simple}	[parmetis]	Defines the external tool that performs the partitioning of the, e.g. by graph-partitioning. <i>simple</i> does not change the initial partitioning, i.e., its a random distribution of the macro elements to the processors.
(name)->box partitioning	bool	[0]	If the macro mesh is globally refined from macro.stand.2d or macro.stand.3d, then the partitioner may compute the partitioning not based on triangled or tetrahedron, but on (composed) rectangles or boxes. Till now this is implemented only for 3D and Zoltan partitioner.
(name)->log main rank	bool	[0]	If set to <i>true</i> , stdout output will be printed only by the main rank 0. Otherwise, all ranks stdout output will be created.
(name)->pre refine	int	[-1]	If set to -1, the number of pre refinements for the macro mesh will be calculated for the given number of processors. This value can be overwritten by setting a value $\geq 0$ .
(name)->output->serialization filename	string	[]	Name of the parallel serialization file. If at least one stationary problem is serialized, this parameter must be set.
(name)->input->serialization filename	string	[]	Name of the parallel deserialization file. If at least one stationary problem is deserialized, this parameter must be set.
(name)->debug output dir	string	[]	Path name where debug data should be written to.
(name)->write parallel debug file	bool	[0]	If set to <i>true</i> , the parallelization will create for each rank a file with the name "mpi-dbg-{rank-no}.dat". This files contain information about all DOF indices in ranks domain. They may be useful for debugging or some postprocessing steps.

## OEMSolver

Standard parameters for OEMSolver

keyword	data type	default	description
(solver)->left precon	enum {diag,ilu,ic,no}	[no]	left preconditioner
(solver)->right precon	enum {diag,ilu,ic,no}	[no]	right preconditioner
(solver)->ell	int	[1]	additional solver parameter
(solver)->tolerance	double	[0.0]	Solver tolerance norm(r).
(solver)->relative tolerance	double	[0.0]	Relative solver tolerance norm(r)/norm(r0).
(solver)->max iteration	int	[1000]	maximal number of iterations.
(solver)->print cycle	int	[100]	Print cycle, after how many iterations the residuum norm is logged.
(solver)->info	int	[0]	info level during solving the system.

Parameters for the direct sparse LU-solver **Umfpack**

keyword	data type	default	description
(solver)->store symbolic	int	[0]	
(solver)->symmetric strategy	int	[0]	
(solver)->alloc init	double	[0.7]	

## ProblemStat

Standard ProblemStat((name)). First konstruktor argument is (name)

keyword	data type	default	description
(name)->components	int	[-1]	Number of problem components (must be set)
(name)->input->read serialization	int	[0]	
(name)->input->serialization with adaptinfo	int	[0]	
(name)->input->serialization filename	string	[]	
(name)->mesh	string	[]	Name of the mesh
(name)->dim	int	[0]	problem dimension
(name)->refinement set[i]	int	[-1]	$i = 0, \dots, \text{nComponents}$ ,
(name)->polynomial degree[i]	int	[1]	$i = 0, \dots, \text{nComponents}$ ,
(name)->solver	enum {cg, cgs, bicg, bicgstab, bicgstab2, bicgstab_ell, qmr, tfqmr, gmres, idr_s, minres, (umfpack), 0}	[0]	iterative/direct solver for the linear system
(name)->estimator[i]	enum {residual, simple-residual, recovery, 0}	[0]	$i = 0, \dots, \text{nComponents}$ , estimator type for each components
(name)->output->write serialization	int	[0]	write serialization files

## RosenbrockAdaptInstationary

RosenbrockAdaptInstationary

keyword	data type	default	description
(name)->rosenbrock method	enum {ros2, rowda3, ros3p, rodasp}	[]	Rosenbrock method that should be used.
(name)->fix first timesteps	int	[0]	If greater than 0, than for the first given number of timesteps the timestep will be not changed and is set to the very first one.

(name)->rosenbrock->timestep study	bool	[0]	If true, the first timestep is calculated with different timesteps. This is usually used to make a study how the time error estimator behaves for different timesteps.
(name)->rosenbrock->timestep study steps	bool	[0]	If dbgTimestepStudy is set to true, then this array contains the timesteps for which the first timestep should be calculated.