

# — HPDDM —

<https://github.com/hpddm/hpddm>

All keywords must be prefixed by `-hpddm.` When no default value is specified in the last column for an option with literal values (e.g., `orthogonalization`), the value used is the first on the list of possible values (e.g., `cgs`) unless another value is set by the user. Options highlighted in **red** should be reserved for expert users.

Keyword	Description	Possible values	Default
<code>help</code>	Display available options	Anything	
<code>tol</code>	Relative decrease in residual norm to reach in order to stop iterative methods	Numeric	$10^{-8}$
<code>max_it</code>	Maximum number of iterations of iterative methods	Integer	100
<code>verbosity</code>	Number of messages printed to screen	Integer	
<code>reuse_preconditioner</code>	Do not factorize again the local matrices when solving subsequent systems	Boolean	
<code>local_operators_not_spd</code>	Assume local operators are general symmetric (instead of symmetric or Hermitian positive definite)	Boolean	
<code>orthogonalization</code>	Method used to orthogonalize a vector against a previously generated orthogonal basis	<code>cgs</code> , <code>mgs</code>	
<code>qr</code>	Method used to perform the distributed QR factorizations	<code>cholqr</code> , <code>cgs</code> , <code>mgs</code>	
<code>dump_local_matri(ces x_[[:digit:]]+)</code>	Save either one or all local matrices to disk	String	
<code>krylov_method</code>	Type of iterative method used to solve linear systems	<code>gmres</code> , <code>bgmres</code> , <code>cg</code> , <code>gcrodr</code>	
<code>initial_deflation_tol</code>	Tolerance for deflating right-hand sides inside Block GMRES	Numeric	
<code>gmres_restart</code>	Maximum number of Arnoldi vectors generated per cycle	Integer	50
<code>gmres_recycle</code>	Number of harmonic Ritz vectors to compute	Integer	
<code>variant</code>	Select the preconditioning side	<code>left</code> , <code>right</code> , <code>flexible</code>	
<code>geneo_nu</code>	Number of local eigenvectors to compute for adaptive methods	Integer	20
<code>geneo_threshold</code>	Threshold for selecting local eigenvectors for adaptive methods	Numeric	
<code>geneo_eigensolver_tol</code>	Tolerance for computing eigenvectors by ARPACK or LAPACK	Numeric	$10^{-6}$
<code>master_p</code>	Number of master processes	Integer	1
<code>master_distribution</code>	Distribution of coarse right-hand sides and solution vectors	<code>centralized</code> , <code>sol</code> , <code>sol_and_rhs</code>	
<code>master_topology</code>	Distribution of the master processes	0, 1, 2	
<code>master_filename</code>	Save the coarse operator to disk	String	
<code>master_exclude</code>	Exclude the master processes from the domain decomposition	Boolean	
<code>master_not_spd</code>	Assume the coarse operator is general symmetric (instead of symmetric positive definite)	Boolean	

When using Schwarz methods, there are additional options.

Keyword	Description	Possible values
<code>schwarz_method</code>	Type of Schwarz preconditioner used to solve linear systems	<code>ras</code> , <code>oras</code> , <code>soras</code> , <code>asm</code> , <code>osm</code> , <code>none</code>
<code>schwarz_coarse_correction</code>	Type of coarse correction used in two-level methods	<code>deflated</code> , <code>additive</code> , <code>balanced</code>

When using substructuring methods, there is an additional option.

Keyword	Description	Possible values
<code>substructuring_scaling</code>	Type of scaling used in the definition of the Schur complement preconditioner	<code>multiplicity</code> , <code>stiffness</code> , <code>coefficient</code>

When using MKL PARDISO has a subdomain solver (resp. coarse operator solver), there are additional options, cf. <https://software.intel.com/en-us/node/470298> (resp. <https://software.intel.com/en-us/node/590089>).

Keyword	Description	Possible values
<code>mkl_pardiso_iparm_(2 8 1[013] 2[147])</code>	Integer control parameters of MKL PARDISO for the subdomain solvers	Integer
<code>master_mkl_pardiso_iparm_(2 1[013] 2[17])</code>	Integer control parameters of MKL PARDISO for the coarse operator solver	Integer

When using MUMPS has a subdomain solver (resp. coarse operator solver), there are additional options, cf. <http://mumps.enseeiht.fr/index.php?page=doc>.

Keyword	Description	Possible values
<code>mumps_icntl_([6-9]  [1-3] [0-9]  40)</code>	Integer control parameters of MUMPS for the subdomain solvers	Integer
<code>master_mumps_icntl_([6-9]  [1-3] [0-9]  40)</code>	Integer control parameters of MUMPS for the coarse operator solver	Integer

When using *hypre* has a coarse operator solver, there are additional options, cf. <http://acts.nersc.gov/hypre/#Documentation>.

Keyword	Description	Possible values	Default
<code>master_hypre_solver</code>	Solver used by <i>hypre</i> to solve coarse linear systems	<code>fgmres</code> , <code>pcg</code> , <code>amg</code>	
<code>master_hypre_tol</code>	Relative convergence tolerance	Numeric	$10^{-12}$
<code>master_hypre_max_it</code>	Maximum number of iterations	Integer	500
<code>master_hypre_gmres_restart</code>	Maximum number of Arnoldi vectors generated per cycle when using FlexGMRES	Integer	100
<code>master_boomeramg_coarsen_type</code>	Parallel coarsening algorithm	Integer	6
<code>master_boomeramg_relax_type</code>	Smoother	Integer	3
<code>master_boomeramg_num_sweeps</code>	Number of sweeps	Integer	1
<code>master_boomeramg_max_levels</code>	Maximum number of multigrid levels	Integer	10
<code>master_boomeramg_interp_type</code>	Parallel interpolation operator	Integer	0