MOSEK Release notes

Release 10.2.11

MOSEK ApS

03 December 2024

Contents

Chapter 1

Supported platforms

Below are the **minimal requirements** for various **MOSEK** interfaces and operating systems. In some cases using **MOSEK** with older versions of the software will be possible, but is neither actively supported nor tested.

Operating systems

Table 1.1: Operating systems

Platform	Minimal OS version	Specific library dependencies
linux64x86	RHEL 7, Ubuntu 18.04 or compatible	`GLIBC 2.17, GLIBCXX 3.4.11`
osx64x86	macOS 10.15	
win64x86	Windows 10, Server 2016	
win32x86	Windows 10, Server 2016	
linuxaarch64	Ubuntu 20.04 or compatible	`GLIBC 2.29, GLIBCXX 3.4.26`
osxaarch64	macOS 11	

Optimizer API and Fusion API

Table 1.2: Optimizer API and Fusion API (where available).

Platform	C	C++(Fusion)	Java	.NET	.NET Core	Python	Julia	Rust
linux64x86	Yes	C++11	1.8	–	netstandard2.0	3.7-3.13	1.6	1.59
osx64x86	Yes	C++11	1.8	–	netstandard2.0	3.7-3.12	1.6	1.59
win64x86	Yes	C++11	1.8	4.5	netstandard2.0	3.7-3.13	1.6	1.59
win32x86	Yes	–	–	4.5	–	–	–	–
linuxaarch64	Yes	C++11	1.8	–	netstandard2.0	3.7-3.13	1.6	1.59
osxaarch64	Yes	C++11	17	–	netstandard2.0	3.8-3.13	1.6	1.59

Optimization Toolbox for MATLAB, Rmosek and other MOSEK tools

Table 1.3: Other APIs and tools.

Platform	MAT-LAB	R	AMPL Shell	MOSEK to AMPL link	Opt-Server	Opt-ServerLight	lm-grd
linux64x86	R2017a	3.6	—	Yes	Yes	Yes	Yes
osx64x86	R2017a	3.6	—	Yes	–	Yes	Yes
win64x86	R2017a	3.6	—	Yes	–	Yes	Yes
win32x86	–	–	–	Yes	–	–	Yes
linux-aarch64	–	–	–	–	–	Yes	Yes
osxaarch64	R2022b	4.1	–	–	–	Yes	Yes

Other distribution channels

- A Python Anaconda package. https://anaconda.org/MOSEK/mosek

- A Python wheels package. https://pypi.org/project/Mosek/

- A NuGet package. https://www.nuget.org/packages/Mosek/

- A Julia package. https://github.com/MOSEK/Mosek.jl

- A Rust package. https://lib.rs/crates/mosek

Other remarks

- Numpy is required in Python Fusion.

Chapter 2

Major changes

Specific information regarding particular APIs, parameters and portability of code from version 9 can be found in the section *Interface changes* towards the end of the respective manual. This section lists general changes throughout **MOSEK**.

2.1 Release notes for 10.2

2.1.1 New features

Fusion

- Introduced the "Pythonic" extension in the Python *Fusion* API. It equips *Fusion* objects with operators and indexing familiar from NumPy and other tools, so that one can write x+y, A@x<=b, x[1:] etc. for *Fusion* variables/expresisons x,y. See the reference guide.

Licensing

- Updated FLEXlm to version 11.19.6. Upgrade of floating license servers is required to use **MOSEK** 10.2 clients.

2.1.2 Deprecation notices

Platform support

- The packages for win32x86 (32bit Windows) and osx64x86 (Intel CPU Apple) will be dropped in the next major release **MOSEK** 11.

2.2 Release notes for 10.1

2.2.1 New features

Platform support

- Introduce Julia and Rust as officially supported Optimizer API interfaces with full documentation.

- Introduce support for Python 3.11 and later 3.12.

- Introduce the native M1 **MOSEK** Optimization Toolbox for the native beta M1 (Apple Silicon) release of MATLAB.

Remote optimization

- Released OptServerLight - a minimal, easy to install, stateless version of OptServer on all major platforms.

Mixed-integer optimizer

- Branch variable selection has been significantly improved. By default the solver automatically selects the best variable selection method and adjusts work limits related to strong branching based on problem characteristics. The variable selection method can be controlled with the parameter `MSK_IPAR_MIO_VAR_SELECTION`.

- Knapsack cover cuts are now enabled by default.

- Conflict analysis based on dual ray analysis has been added. This can be controlled with the parameter `MSK_IPAR_MIO_DUAL_RAY_ANALYSIS_LEVEL`.

2.2.2 Removed features

- AMPL support has been removed from the command line tool, since a new interface has been made avialble from AMPL Inc. Contact support in case this give rise to questions.

2.3 Release notes for 10.0

2.3.1 New features

Platform support

- Introduced native support for Apple Silicon M1 `osxaarch64`.

- Improved support and introduced multithreading for Linux ARM 64bit `linuxaarch64`.

Optimizer

- Introduced new cone types: generalized power cone (primal and dual), geometric mean cone (primal and dual) and the cone of vectorized lower-triangular parts of semidefinite matrices.

Presolve

- Presolve has been improved significantly for conic problems.

Interior-point Optimizer

- Improved performance for large-scale linear problems.

- Significantly improved performance when running on recent AMD CPUs.

- Significantly improved multithreaded performance for a class of SDPs.

Mixed-integer Optimizer

- (Optimizer API and Fusion). Introduced disjunctive constraints (DJC), a language for writing constraints of the form A_1 OR A_2 OR ... OR A_k where A_i are ordinary linear equations or inequalities.

- Improved cutting plane separation; in particular, implied bound cuts, controllable with the parameter `MSK_IPAR_MIO_CUT_IMPLIED_BOUND`, are used by default.

- Improved presolve, in particular probing and the aggregator. The latter can be controled with the new parameter `MSK_IPAR_MIO_PRESOLVE_AGGREGATOR_USE`.

- Introduced symmetry detection and exploitation, controllable with the parameter `MSK_IPAR_MIO_SYMMETRY_LEVEL`.

- Introduced reformulation methods for MIQCQO problems, controllable with the parameter `MSK_IPAR_MIO_QCQO_REFORMULATION_METHOD`. This allows the solution of non-convex MIQCQO problems that are amenable to such a reformulation.

- Introduced parameters `MSK_IPAR_MIO_NUMERICAL_EMPHASIS_LEVEL` and `MSK_IPAR_MIO_MEMORY_EMPHASIS_LEVEL` that may be used to reduce numerical and memory issues, respectively.

- Distinction between complete and partial initial user solutions, the exploitation of the latter being controllable with the parameter `MSK_IPAR_MIO_CONSTRUCT_SOL`.

Multithreading

- Switch from Cilk to the oneTBB library for multithreading in the interior-point optimizer. The reason is Cilk has been deprecated in the Intel C compiler tool chain. Moreover, compared to Cilk oneTBB allows fine grained control of the number of threads employed in each optimization.

- Introduce parallel optimization of a number of tasks in the Optimizer API (`optimizebatch`) and Fusion (`solveBatch`).

- Previously missing support for multithreading has been enabled on the `linuxaarch64` (Linux ARM64) platform.

Licensing

- Updated FLEXlm to version 11.18.3. Upgrade of floating license servers is required to use **MOSEK** 10 clients.

- License server available for all platforms.

Interface

- (Optimizer API). Introduced affine conic constraints (ACC) as a preferred method of expressing conic problems. An affine conic constraints allows the user to directly write $Fx + g \in \mathcal{K}$ without introducing slack variables.

- (Optimizer API). Introduced the possibility to create tasks without an environment.

- (Optimizer API, Python, Java, .NET). Methods can return arrays and tuples instead of taking them as arguments.

- (Fusion). Allow more flexible naming in *Fusion*.

I/O

- Faster I/O across all file formats.

- Fixed interpretation of integer keyword in LP files.

- The PTF format replaces the OPF format as a read/write human-readable file format for conic problems, supporting also semidefinite variables.

- (Optimizer API and Fusion) Allow writing data files to streams instead of files.

2.3.2 Changes compared to version 9

- The function `computesparsecholesky` has changed API: the argument previously indicating whether to use multiple threads or not is now an integer denoting the number of threads to use, with 0 meaning that **MOSEK** makes the choice.

2.3.3 Removed features

- Support for Python 2.7 on all platforms.

- Support for Java on Windows 32 bit.

- Support for all versions of Python on Windows 32 bit.

2.3.4 Deprecated features

- Conic constraints restricted to $x \in \mathcal{K}$ for a variable x are deprecated as a method of representing conic problems in favor of affine conic constraints (ACC) of the form $Fx + g \in \mathcal{K}$. This affects mainly the Optimizer API, in a minor degree the Optimization Toolbox for MATLAB and Rmosek, and does not affect *Fusion* where this language was already used.

- The OPF file format for conic problems is deprecated in favor of PTF.

- It is recommended to move away from Windows 32 bit platform.

Chapter 3

Known issues

Chapter 4

Bug fixes

10.2.11

- Fixed a bug that incorrectly triggered an assert in the postsolve for some ill-posed conic problems.

10.2.10

- Additional option in OptServerLight to limit the number of threads.

10.2.8

- Initiated support for Python 3.13 in **MOSEK** 10.2.
- Fixed a bug in communication with OptServer in certain configurations.

10.2.7

- Fixed an issue with return status for certain presolve-infeasible mixed-integer problems.

10.2.6

- Disabled an invalid internal assert.

10.2.5

- Fixed some typos in the documentation.
- Fixed a problem in the solution of conic optimizer that in rare case caused an invalid dual solution to be reported.

10.2.4

- Fixed a bug in the CBF file format reader affecting certain problems.
- Added missing information items to JSON solution returned from OptServerLight.

10.2.3

- Added a minimum TLS version option in OptServerLight.

10.2.2

- Fixed a rarely occurring bug in postsolve.
- Added propagation of license path to the global environment.
- Fixed a possible race condition that could lead to a crash in OptServerLight.
- Fixed a bug in some rarely used ways to define binary variables in *Fusion*.
- Reinstated missing checks enforcing correct array argument lengths in some Optimizer APIs.

10.2.1

- Fixed a 32 bit integer overflow potentially happening in the dualizer for linear problems.

10.2.0

- Fixed a rarely occuring bug in the post solve.
- Report an error if feasibility repair is a applied to a problem with affine conic constraints.

10.1.31

- Further updates in Rmosek to avoid compilation warnings.

10.1.29

- Updated Rmosek to avoid a string formatting compilation warning.
- Fixed issues with using a sparse ranged domain in *Fusion*.
- Fixed compression type detection when writing solution files.
- Fixed a bug in handling parameterized disjunctions in *Fusion*.

10.1.28

- Fixed a bug that caused indeterministic behaviour on certain conic quadratic optimization problems.
- Fixed an issue with adding certain parameterized expressions in *Fusion*.
- Fixed a bug that could cause a crash in cut generation.

10.1.27

- Relaxed criteria for accepting an initial solution in MIO.

10.1.26

- Improved license debug log.

10.1.25

- Improved error reporting in `mosek_read` in Rmosek.
- Changed an internal identifier in *Fusion* clashing with a macro in some headers on Windows.

10.1.24

- Fixed a bug in slicing/picking/indexing from parameterized expressions in *Fusion*.

10.1.23

- Fixed a bug in slicing parameters in *Fusion*.
- Rmosek patched to handle Matrix package v1.6-4.
- Updates in FAQ.

10.1.22

- Fixed reporting of some information items.
- Updated some outdated information in the FAQ.

10.1.21

- Fixed a bug triggering an assert in the post solve for certain conic optimization problems.

10.1.20

- Fixed the boundary cases of emission of warnings.
- Updated Rmosek to process parameters before data.

10.1.19

- Removed debug code introduced in 10.1.14 which could affect some exponential cone problems.

10.1.18

- Fixed an insignificant naming inconsistency in Python *Fusion*.
- Fixed the MPS writer when using CPLEX format.
- Updates in FAQ.

10.1.17

- Fixed handling of Unicode characters in the license path on Windows.
- Reduced the size of Python *Fusion* source by removing redundant comments.
- Improved the documentation related to convexity tolerances.
- Improved behavior of the mixed-integer solver in a special case.

10.1.16

- Fix bugs that could cause a crash in presolve and postsolve in rare cases.
- Fixed index origin in infeasibility reports printed to the log.

10.1.15

- Fixed a bug causing a missing `acc/b` vector in the JTask format in some cases.

- Initialized support for Python 3.12.

10.1.14

- Improved presolve slightly for some conic problems.

- Improved the problem analyzer.

- Modernized the internal code of the Rmosek toolbox.

- Added export list in the Python *Fusion* module.

10.1.13

- Fixed a reallocation issue which could cause a bug when updating `barf`.

- Updated portfolio examples with solution status checks.

- Fixed solution file naming by the command line tool for `.zst` inputs.

10.1.12

- Fixed a convergence issue in the computation of LambertW.

- Updated the manual in many places. Information about MATLAB `R2023b`.

- Fixed a bug in presolve affecting only some problems having exponential cone constraints.

- Fixed a name clash in Julia.

- Fixed a bug in the Julia API.

10.1.11

- Fixed some bugs in handling linear combinations of symmetric matrix storage elements with more than one term.

- Fixed a bug occurring when semidefinite terms are updated with new data.

- Fixed a rare bug in writing semidefinite terms in JTask format which would occur after problem updates.

- Allow NULL-like arguments in the Rust API.

- Adapted log output buffering so that it writes a full line at a time.

- Fixed a bug that could cause a crash after failed connection to the OptServer.

- Cleaned up some corner cases in the PTF format: include `y` vector in solution, optionally include parameters and solutions, respect relevant parameters.

10.1.10

- Fixed some bugs in the handling of symmetric matrix storage.

- Fixed handling of a special case of power cones with `nleft=1` by the MIO presolve.

- Fixed passing `nothing` as an argument at the relevant points in the Julia API.

- Fixed a bug in index manipulations in `putafebarfentrylist` in Julia.

- Fixed a bug in writing and reading linear combinations of symmetric matrices in PTF files.

- Fixed a bug in cloning tasks with disjunctive constraints.

- Fixed a rare issue that could lead to a crash in the MIO optimizer.

10.1.9

- Fixed a rare bug that could trigger an assert in the postsolve.
- Fixed incorrect indexing in `putafebarfentrylist` in Julia.
- Fixed cloning of a task with semidefinite data.

10.1.8

- Fixed a bug in indexing parameter slices in *Fusion*.
- Fixed log output from OptServerLight to a file.
- Enabled Rmosek to consume an initial point for conic mixed-integer problems.
- Fixed incomplete log reporting of initial solutions by the mixed-integer optimizer.
- First stable release under version 10.1.

10.1.7(BETA)

- Fixed a path issue that could prevent OptServerLight from launching tasks.

10.1.6(BETA)

- Fixed a bug that would cause OptServerLight to crash if the optimizer terminated with an error code.
- Added `Model.dataReport()` in *Fusion*.

10.1.5(BETA)

- Fixed Wheel naming to be PEP600-compatible.
- Improved performance of interior-point optimizer for certain models.
- Improved the CBF and PTF readers to provide more debug information.
- Updated the BLAS version to fix a read outside boundaries.
- Allow C++ *Fusion* to consume a `const` raw input vector.
- Fixed a possible issue in the MIP optimizer when all variables are fixed in presolve.

10.1.4(BETA)

- Fixed some input size checks in the Optimizer API for Java.

10.1.3(BETA)

- Fixed a rare issue in *Fusion* which could appear when a parameterized expression becomes trivial.

10.1.2(BETA)

- Efficiency improvement in `Expr.mul` with dense input in Python *Fusion*.
- Fixed a very rare issue in task format reader related to names.

10.1.1(BETA)

- Fixed solution postprocessing after user break in the conic optimizer.

- Fixed MPS writer for some rare integer models.

- Fixed a bug in removing symmetric matrix variables.

10.1.0(BETA)

- Initiate support for Python 3.11.

- Initiate Julia and Rust as official APIs with a manual.

- Initiate OptServerLight, a lightweight, simple edition of the remote optimization server.

- Include the native M1 **MOSEK** Optimization Toolbox for the native M1 (Apple Silicon) release of MATLAB.

10.0.46

- Corrected usage of global environment in C++ *Fusion*.

10.0.45

- Fixed an initialization issue for disjunctive constraints.

10.0.44

- Cleaned up exported library symbols on macOS.

10.0.43

- Fixed numerical problem in presolve that could occur with disjunctive constraints in the problem.

- Fixed a rare issue triggering an assert on some problems that have exponential cone constraints.

- Fixed a rare issue causing a 32 bit integer overflow.

- Reduced an inefficient memory allocation during remote optimization.

- Fixed a bug in the reporting of the problem analyzer.

10.0.40

- Fixed a rare overflow issue for very large semidefinite problems.

10.0.39

- Fixed a rare issue in the PTF file reader leading to an infinite loop.

10.0.38

- Fixed an issue that could make creation of multiple tasks inefficient on some platforms.

10.0.37

- Fixed a bug that triggered an assert for certain conic optimization problems.
- Fixed an issue in *Fusion* when a sparse expression is constrained to a semidefinite domain.
- Fixed an issue in *Fusion* not always reporting an error if semidefinite terms are parameterized.
- Fixed a rare issue in linear dependency check in the mixed-integer optimizer.

10.0.36

- Fixed a bug in processing parameterized dot products in *Fusion*.

10.0.35

- Updated OptServer to version 2.1.37.
- Fixed a database field width error in the OptServer.
- Fixed a concurrent map write error in the OptServer.
- Fixed some inconsistencies in the installation script of the OptServer.
- Fixed an issue that could cause a segfault when remote server address was incorrect.
- Fixed a rare solution access error when adding new variables to a solved problem.
- Fixed missing log output when testing license checkouts.
- Fixed a bug that affected the conic optimizer for certain problems.
- Updated CVXPY parameter setting example in the FAQ.

10.0.34

- Fixed an issue reading signed numbers from LP files.
- Fixed a rare issue with incorrect ill-posedness certificates.

10.0.33

- Fixed a rare numerical issue in the mixed-integer optimizer.

10.0.32

- Fixed an issue causing an assert in the presolve in rare cases.
- Fixed missing ACC activities for integer solutions in PTF files.

10.0.31

- Fixed an assert in the presolve occuring for ceratin conic optimization problems.
- Fixed some memory leaks.
- Fixed a bug in `Expr.pick` for sparse expressions in *Fusion*.

10.0.30

- Fixed a 32bit integer overflow occurring for certain semi-definite optimization problems.

- Fixed a rare assert in the quadratic optimizer.

- Fixed an assert in feasibility repair for problems with affine conic constraints.

10.0.29

- Fixed a bug in the presolve occuring for certain conic problems. The bug would trigger an assert.

- Added work limits for variable linear dependency check in the mixed-integer solver.

10.0.28

- Fixed bugs in the presolve occuring for certain conic problems.

- Small updates in documentation and FAQ.

- Some improvements in symmetry detection in the mixed-integer optimizer, especially regarding memory consupmtion.

10.0.27

- Fixed an issue with cloning a *Fusion* model which contains solutions.

- Fixed an issue with reading task files containing certain partial solution configurations.

- Fixed an exception handling error which could occur when reading invalid task files.

10.0.26

- Fix fetching values for partially defined user solutions.

10.0.25

- Fixed possible inconsistencies when one domain object enters many constraints in *Fusion*.

- Fixed a minor issue regarding reading special parameter values from a task file.

10.0.24

- Fixed a memory leak appearing when disposing a C++ *Fusion* model with conic or disjunctive constraints.

10.0.23

- Fixed a rare memory reallocation issue in *Fusion*.

- Silenced some deprecation warnings related to `numpy` in *Fusion*.

10.0.22

- Fixed a bug occuring for certain conic problems.

- Fixed a status code check syntax error affecting `intlinprog`.

- Fixed an issue with cleaning the task when reading data from a string.

10.0.21

- Downgrade .NET Core package target to .NETStandard2.0.

- Fixed a bug occuring for certain conic problems.

10.0.20

- Fixed a bug occurring for certain ways to call BLAS/LAPACK functions on AMD.

- Fixed a bug in mixed-integer optimizer setup for quadratic problems (QO).

- Fixed some minor bugs in the presolve occuring on conic problems.

10.0.18

- First stable release.

- Fixed an issue with propagating initial solutions for MIQO and MIQCQO problems.

- Improved efficiency of file I/O.

10.0.17(BETA)

- Fixed a bug that could causing invalid infeasibility certificates to be reported for quadratic optimization problems.

- Improved presolve slightly for conic problems.

- Improved performance for some semi-definite problems, particularly when using multiple threads.

10.0.16(BETA)

- Improved performance for some semi-definite problems, particularly when using multiple threads.

- Fixed some issues related to file formats.

10.0.15(BETA)

- Improved documentation.

- Environment-free task creation in optimizer API.

- Fixed a multithreading issue on Linux ARM64.

10.0.14(BETA)

- The (plain) solution file now contains the solution for the affine conic constraints when present.

- Fixed a bug occuring when deleting one or more variables.

- Documented new naming possibilities in Fusion.

- Removed some debug output.

10.0.13(BETA)

- Downgrade Linux 64x86 platform requirements to RHEL 7, Ubuntu 18.04.

- Downgrade MATLAB version requirement to R2017a.

- Fixes in the remote optimization server and improved communication with the server.

- Writing files to streams.

- Batch optimization also available in Fusion.

- Fixed a bug that in rare cases caused an assert in the interior-point optimizer.

10.0.12(BETA)

- First beta release.

- See Sec. 2 and the *Interface changes* section towards the end of your API manual.