The MOSEK Release Notes. Version 7.0 (Revision 141).

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- Published by MOSEK ApS, Denmark.

Contents

Chapter 1

Changes and new features in MOSEK

The section presents improvements and new features added to MOSEK in version 7.0.

1.1 Platform support

In Table 1.1 the supported platform and compiler used to build MOSEK shown. Although RedHat is explicitly mentioned as the supported Linux distribution then MOSEK will work on most other variants of Linux. However, the license manager tools requires Linux Standard Base 3 or newer is installed.

1.2 General changes

- The interior-point optimizer has been extended to semi-definite optimization problems. Hence, MOSEK can optimize over the positive semi-definite cone.
- The network detection has been completely redesigned. MOSEK no longer try detect partial networks. The problem must be a pure primal network for the network optimizer to be used.
- The parameter iparam.objective_sense has been removed.
- The parameter iparam.intpnt_num_threads has been removed. Use the parameter iparam.num_threads instead.
- MOSEK now automatically exploit multiple CPUs i.e. the parameter iparam.num_threads is set to 0 be default. Note the amount memory that MOSEK uses grows with the number of threads employed.

Platform	OS version	C compiler
linux32x86	Redhat 5 or newer (LSB 3+)	Intel C 13.1 (gcc 4.3, glibc 2.3.4)
linux64x86	RedHat 5 or newer (LSB 3+)	Intel C 13.1 (gcc 4.3, glibc 2.3.4)
osx64x86	OSX 10.7 Lion or newer	Intel C 13.0 (llvm-gcc-4.2)
win32x86	Windows XP, Server 2003 or newer	Intel C 13.0 (VS 2008)
win64x86	Windows XP, Server 2003 or newer	Intel C 13.1 (VS 2008)

Interface	Supported versions
Java	Sun Java 1.6+
Microsoft.NET	2.1+
Python 2	2.6+
Python 3	3.1+

Table 1.1: Supported platforms

- The MBT file format has been replaced by a new task format. The new format supports semi-definite optimization.
- the HTML version of the documentation is no longer included in the downloads to save space. It is still available online.
- MOSEK is more restrictive about the allowed names on variables etc. This is in particular the case when writing LP files.
- MOSEK no longer tries to detect the cache sizes and is in general less sensitive to the hardware.
- The parameter is set iparam.auto_update_sol_info is default off. In previous version it was by default on.
- The function relaxprimal has been deprecated and replaced by the function primalrepair.

1.3 Optimizers

1.3.1 Interior point optimizer

- The factorization routines employd by the interior-point optimizer for linear and conic optimization problems has been completely rewritten. In particular the dense column detection and handling is improved. The factorization routine will also exploit vendor tuned BLAS routines.

1.3.2 The simplex optimizers

- No major changes.

1.3.3 Mixed-integer optimizer

- A new mixed-integer for linear and conic problems has been introduced. It is from run-to-run determinitic and is parallelized. It is particular suitable for conic problems.

1.4 API changes

- Added support for semidefinite optimization.
- Some clean up has been performed implying some functions have been renamed.

1.5 Optimization toolbox for MATLAB

- A MOSEK equivalent of `bintprog` has been introduced.
- The functionality of the MOSEK version of `linprog` has been improved. It is now possible to employ the simplex optimizer in `linprog`.
- `mosekopt` now accepts a dense A matrix.
- An new method for specification of cones that is more efficient when the problem has many cones has introduced. The old method is still allowed but is deprecated.
- Support for semidefinite optimization problems has been added to the toolbox.

1.6 License system

- Flexlm has been upgraded to version 11.11.

1.7 Other changes

- The documentation has been improved.

1.8 Interfaces

- Semi-definite optimization capabilities have been add to the optimizer APIs.
- A major clean up have occured in the optimizer APIs. This should have little effect for most users.
- A new object orientated interface called Fusion has been added. Fusion is available Java, MATLAB, .NET and Python.
- The AMPL command line tool has been updated to the latest version.

1.9 Platform changes

- 32 bit MAC OSX on Intel x86 (osx32x86) is no longer supported.
- 32 and 64 bit Solaris on Intel x86 (solaris32x86,solaris64x86) is no longer supported.

Chapter 2

Limitations and known issues

- Operating system user names containing spaces can result in problems with the license system.
- We advise against simultaneously using multiple MOSEK environments within a single program as this might cause problems with the Flexlm licensing system.

Chapter 3

Libraries

MOSEK consists of several libraries. When packaging software using MOSEK for redistribution, only a subset of these are required, depending on the platform.

3.1 C/C++

When redistributing a program or library linked with MOSEK, following libraries must be included:

Linux	
64-bit	32-bit
`libmosek64.so.7.0`	`libmosek.so.7.0`
`libmosekglb64.so.7.0`	`libmosekglb.so.7.0`
`libiomp5.so`	`libiomp5.so`
Windows	
64-bit	32-bit
`mosek64_7_0.dll`	`mosek7_0.dll`
`mosekglb64_7_0.dll`	`mosekglb7_0.dll`
`libiomp5md.dll`	`libiomp5md.dll`
OS X	
64-bit	
`libmosek64.dylib.7.0`	
`libmosekglb64.dylib.7.0`	
`libiomp5.dylib`	

3.2 Java

When redistributing a Java application using with MOSEK, following libraries must be included:

Linux	
64-bit	32-bit
libmosek64.so.7.0	libmosek.so.7.0
libmosekglb64.so.7.0	libmosekglb.so.7.0
libiomp5.so	libiomp5.so
libmosekjava7_0.so	libmosekjava7_0.so
libmosekxx7_0.so	libmosekxx7_0.so
libmosekscopt7_0.so	libmosekscopt7_0.so
Windows	
64-bit	32-bit
mosek64_7_0.dll	mosek7_0.dll
mosekglb64_7_0.dll	mosekglb7_0.dll
libiomp5md.dll	libiomp5md.dll
mosekjava7_0.dll	mosekjava7_0.dll
mosekxx7_0.dll	mosekxx7_0.dll
mosekscopt.dll	mosekscopt.dll
OS X	
64-bit	
libmosek64.dylib.7.0	
libmosekglb64.dylib.7.0	
libiomp5.dylib	
libmosekjava7_0.dylib	
libmosekxx7_0.dylib	
libmosekscopt7_0.dylib	

By default the MOSEK/Java interface will look for the binaries in the same directory as the `.jar` file, so they should be placed in the same directory when redistributing.

3.3 .NET

When redistributing a .NET application using with MOSEK, following libraries must be included:

64-bit Windows	32-bit Windows
mosek64_7_0.dll	mosek7_0.dll
mosekglb64_7_0.dll	mosekglb7_0.dll
libiomp5md.dll	libiomp5md.dll
mosekxx7_0.dll	mosekxx7_0.dll
mosekscopt.dll	mosekscopt.dll
mosekdotnet.dll	mosekdotnet.dll

3.4 Python

When redistributing a Python application using with MOSEK, following libraries must be included:

Linux	
64-bit	32-bit
libmosek64.so.7.0	libmosek.so.7.0
libmosekglb64.so.7.0	libmosekglb.so.7.0
libiomp5.so	libiomp5.so
libmosekxx7_0.so	libmosekxx7_0.so
libmosekscopt7_0.so	libmosekscopt7_0.so
Windows	
64-bit	32-bit
mosek64_7_0.dll	mosek7_0.dll
mosekglb64_7_0.dll	mosekglb7_0.dll
libiomp5md.dll	libiomp5md.dll
mosekxx7_0.dll	mosekxx7_0.dll
mosekscopt.dll	mosekscopt.dll
OS X	
64-bit	
libmosek64.dylib.7.0	
libmosekglb64.dylib.7.0	
libiomp5.dylib	
libmosekxx7_0.dylib	
libmosekscopt7_0.dylib	

Furthermore, one (or both) of the directories

- `python/2/mosek` for Python 2.x applications, and
- `python/3/mosek` for Python 3.x applications.

must be included.

By default the MOSEK/Python API will look for the binary libraries in the MOSEK module directory, i.e. the directory containing `__init__.py`. Alternative, if the binary libraries reside in another directory, the application can pre-load the `mosekxx` library from another located before `mosek` is imported, e.g. like this

```
import ctypes ; ctypes.CDLL('my/path/to/mosekxx.dll')
```

Chapter 4

Open source libraries include in MOSEK

4.1 zlib

MOSEK includes the zlib library obtained from the zlib website. The license agreement for zlib is shown below.

```
zlib.h -- interface of the 'zlib' general purpose compression library
version 1.2.7, May 2nd, 2012

Copyright (C) 1995-2012 Jean-loup Gailly and Mark Adler

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   in a product, an acknowledgment in the product documentation would be
   appreciated but is not required.
2. Altered source versions must be plainly marked as such, and must not be
   misrepresented as being the original software.
3. This notice may not be removed or altered from any source distribution.

Jean-loup Gailly        Mark Adler
jloup@gzip.org          madler@alumni.caltech.edu
```

4.2 fplib

MOSEK includes the floating point formating library developed by David M. Gay obtained from the netlib website. The license agreement for fplib is shown below.

```
/****************************************************************
 *
 * The author of this software is David M. Gay.
 *
 * Copyright (c) 1991, 2000, 2001 by Lucent Technologies.
 *
 * Permission to use, copy, modify, and distribute this software for any
 * purpose without fee is hereby granted, provided that this entire notice
 * is included in all copies of any software which is or includes a copy
 * or modification of this software and in all copies of the supporting
 * documentation for such software.
 *
 * THIS SOFTWARE IS BEING PROVIDED "AS IS", WITHOUT ANY EXPRESS OR IMPLIED
 * WARRANTY.  IN PARTICULAR, NEITHER THE AUTHOR NOR LUCENT MAKES ANY
 * REPRESENTATION OR WARRANTY OF ANY KIND CONCERNING THE MERCHANTABILITY
 * OF THIS SOFTWARE OR ITS FITNESS FOR ANY PARTICULAR PURPOSE.
 *
 ***************************************************************/
```

Chapter 5

Bug fixes and improvements

7.0.0.140

- Fixed issue occurring when infeasible initial solutions was passed to the mixed integer optimizer.

7.0.0.140

- Updated Flexlm to version 11.11.2.

7.0.0.139

- Fixed an array type-checking bug in the Python optimizer API.

7.0.0.136

- Fixed a bug causing the 32 bit versions to crash for very large problems instead of reporting out of space.

7.0.0.134

- Fixed a stability issue in the mixed integer conic optimizer.

7.0.0.133

- Fixed a bug in the mixed integer conic optimizer.

7.0.0.132

- Fixed a glitch in the AMPL interface appearing when a nonlinear problem is solved and a solution is available.

7.0.0.131

- Fixed a bug occurring when fetching solution values through certain kinds of variable slices.

7.0.0.130

- Fixed an important bug in the LP file reader when terms like x*x appeared in a quadratic expression.

7.0.0.129

- Fixed a bug that caused MOSEK to crash if too many licenses is requested.

7.0.0.128

- Fixed a bug in the CPU detection which did not work for some combinations of CPUs and OSes.

7.0.0.127

- Removed some debug printing.

7.0.0.124

- Fixed an issue in the mixed integer conic optimizer causing the lower bound to be nonmotonic.
- Fixed an issue with stopping criteria in the interior-point optimizer for linear problems.
- Added a new parameter. Therefore, it is recommend to relink applications with this new version.

7.0.0.123

- Fixed a bug that made MOSEK crash for certain dual infeasible problems.

7.0.0.122

- Removed some debug print output.

7.0.0.121

- Improved the presolve.

7.0.0.120

- Fixed a bug causing a crash in the convexity check in rare cases.

7.0.0.119

- Improved the error reporting in the MATLAB toolbox.

7.0.0.118

- Fixed a bug that could occur when using more than 32 threads.
- The branch direction can now be controlled using ipar_mio_mio_branch_dir in the mixed conic optimizer.
- The optimizer employed at the nodes can now be controlled using ipar_mio_node_optimizer in the mixed integer conic optimizer.

7.0.0.117

- Infeasibility was not always correctly reported when detected in presolve. This applies to mixed integer conic optimizer only.

7.0.0.116

- Fixed a bug causing a crash when running out of space in certain cases.

7.0.0.115

- A bug caused the solution status to be unknown in all .NET based APIs.

7.0.0.114

- Some functions e.g. getnumcon and getnumvar did not work in Java in certain cases. In Java they are overloaded and in some cases JVM called the wrong method in the native library.
- Fixed a bug in the Fusion method Expr.mul(double[],Variable) in the case where the variable is two-dimensional.

7.0.0.113

- Fixed an issue that caused MOSEK to use large amounts of memory when reading LP data files.

7.0.0.111

- Tuned the presolve for some nonlinear problems.

7.0.0.110

- Fixed an issue that caused an assert in the basis identification in very rare cases.

7.0.0.107

- Fixed a bug in the sensitivity analysis.
- Updated the license agreement.

7.0.0.106

- Improved the documentation in several places.

- Fixed a bug in the .NET SCopt interface.

7.0.0.105

- Fixed an issue with an incorrect assert in the basis identification.

7.0.0.104

- Tweaked the primal simplex optimizer.
- Objective cuts did not work in the simplex optimizers when the problem was a maximization problem. This problem has been fixed.

7.0.0.103

- Fixed an issue causing an assert on some dual infeasible problems.

7.0.0.102

- Fixed a minor issue in the optimization toolbox for MATLAB.
- Fixed an issue in the interior point optimizer for conic problems.

7.0.0.101

- Made sure the documentation included in the downloads is up to date.

7.0.0.100

- Fixed a bug in the presolve of the mixed-integer optimizer.

7.0.0.99

- Fixed a potential memory leak in the Python parts of MOSEK.

7.0.0.98

- Fixed a bug in putarow and putacol.

7.0.0.97

- Fixed a bug in the presolve potentially affecting problem types.

7.0.0.95

- Fixed a bug in the mixed integer optimizer.
- Fixed an issue in Fusion
- Fixed some typos in the manuals.

7.0.0.94

- Add missing MATLAB Fusion examples to the distribution.
- Ignored the value of ordering method parameter in certain cases.

7.0.0.93

- Internal changes.

7.0.0.92

- Fixed an issue causing a crash on the MATLAB toolbox on linux64x86.
- Improved the documentation on how to use the nonlinear optimizer in C.
- Fixed a bug in the mixed integer optimizer that could cause a crash.

7.0.0.91

- Improved the performance when input semidefinite optimization using the optimization toolbox for MATLAB.
- Fixed a bug that could occur when inputting a semidefinite optimization problem.
- Fixed some bugs in the manual.
- Fixed several bugs in Fusion and the associated examples.

7.0.0.90

- Fixed a bug on the OSX platform that caused problems when using the optimization toolbox for MATLAB.

7.0.0.89

- Fixed a bug in the mixed integer optimizer.
- Fixed a bug on the OSX platform that caused problems loading the MOSEK shared object.

7.0.0.88

- Fixed a bug that triggered an assert for certain semidefinite problems.

7.0.0.87

- Improved the documentation.

7.0.0.86

- Improved the documentation.

7.0.0.85

- Improved the dense column detection.
- Improved the presolve when dealing with numerical bad case related to doubleton equations.

7.0.0.84

- Fixed a bug that made the Java, .NET and Python optimizer APIs crash in special cases.
- Fixed bug in the put solution slice functions that occurred if no solution was previously defined.
- Added the function licensecleanup that manually stops all threads and delete all handles used by the license system.
- Employ a newer version of the Intel C compiler tool chain.

7.0.0.83

- Special characters are now allowed in the license path on Windows.

7.0.0.82

- Fixed a bug that made the interior-point optimizer crash in certain extremely rare cases.
- Updated the toolbox manual.

7.0.0.81

- Updated the toolbox manual.

7.0.0.80

- Fixed a bug that made the mixed integer conic optimizer crash in rare cases when applied to a quadratic optimization problem.
- Updated the portfolio optimization example in the Fusion manual.
- Updated the manual for the optimization toolbox for MATLAB.
- Fixed a bug that cased a crash on Windows 32 bit when solving certain semidefinite optimization problems.
- Fixed a bug that made MOSEK crash when writing problems having symmetric matrix variables to a file.
- Updated the optimization toolbox manual.
- Fixed some issues in linprog and bintprog in the toolbox. In particular the undocumented call linprog('defaults') is supported. It is also supported for quadprog and bintprog too.
- Fixed issue causing incorrect infeasibility violations to be reported in certain cases.
- Fixed an installation issue on MAC OSX.

7.0.0.79

- Updated the fusion documentation.
- Fixed an issue in the quadratic optimizer.
- Fixed some cosmetic issues.

7.0.0.78

- Fixed an issue that in rare cases caused an crash in the interior-point optimizer.

7.0.0.77

- Fixed an issue in the nonlinear optimizer that in rare cases caused a crash.
- Improved the conic mixed integer optimizer for conic problems.
- Fixed several issues in Fusion.

7.0.0.76

- Fixed an issue in the linear dependency checker.
- Fixed an issue in the conic optimizer that made it report a wrong dual solution in rare cases.

7.0.0.75

- Fixed several bugs in the conic optimizer that made it terminate prematurely in some cases.

7.0.0.74

- Fixed several bugs in Fusion. One could cause it to crash.

7.0.0.73

- Fixed a bug in the function removevars.

7.0.0.72

- Fixed a rarely occurring bug in the presolve.
- Bug fixes and cosmetic changes to Fusion.

7.0.0.71

- Fixed a bug in the conic optimizer that in rare cases generated an assert.

7.0.0.70

- Added missing Fusion examples to the distribution.

7.0.0.69

- Added missing Java to the OSX 64 bit distribution.

7.0.0.68

- The examples for MATLAB Fusion has been added to distribution.
- When writing LP files a lot debug output was produced.

7.0.0.67

- Fixed a bug in the conic optimizer hurting the performance.
- Fixed some issues in the nonlinear function interface.

7.0.0.66

- Fixed a bug that affected the exitflag from linprog and friends in the optimization toolbox for MATLAB.
- Fixed bug that made Fusion feed the wrong variables name into the optimizer.

7.0.0.65

- Fixed a bug that affected putarowi.

7.0.0.64

- Fixed a bug that made the functions putacol and putarow skip some sanity checks.
- Fine tuned the termination criterion of the conic interior-point optimizer.

7.0.0.62

- The conic optimizer ignored the maximum optimizer time parameter.
- Improved stability of cut generation in the mixed-integer conic optimizer.
- Fixed a bug that caused maximum time limit to not always be respected.
- Fixed a bug that generated an assert in conic optimize in very rare cases.

7.0.0.61

- Fixed a bug in the conic optimizer that caused an assert in special cases.

7.0.0.60

- Fixed a bug in the MPS file reader. The bug happened if general integer variables are specified using the markers in the columns section.
- The MATLAB toolbox has been updated to deal with issues when using MATLAB R2012a or newer. Please consult the toolbox manual for revised installation instructions.
- On MAC OSX only MATLAB R2012a and now is supported.

7.0.0.59

- Fixed a bug in conic optimizer. The issue occurred if a problem has 1 dimensional semi-definite variables.

7.0.0.58

- Fixed a bug causing an assert in certain cases.

7.0.0.57

- Fixed a bug in the command line tool.
- The mixed integer conic optimizer did not update dinf_mio_obj_bound properly.
- Fixed some issues in the MATLAB optimization toolbox.

7.0.0.56

- Improved the interior-point optimizer for linear problems.

7.0.0.55

- The MATLAB optimization toolbox can now perform feasibility repair.

7.0.0.54

- Fixed some bugs related to changes in version 7.0.0.53.
- Fixed a performance issue in Java Fusion and MATLAB Fusion.

7.0.0.53

- In the MATLAB optimization toolbox the functions `optimget` and `optimset` has been renamed `mskoptimget` and `mskoptimset`.
- Better root node heuristic and other performance improvements in the mixed integer conic optimizer.
- Added the function `mosekdiag` to MATLAB optimization toolbox. The function diagnostic tool for installation problems.
- Fixed a bug in the mixed integer optimizer when using the construct solution feature.

7.0.0.52

- The content of file `consts.xml` has been expanded.

7.0.0.50

- Fixed a bug occurring in the function `removevariables` on conic problems.
- Fixed a bug occurring in the function `clonetask` when the source problem has symmetric matrix variables.
- Fixed a bug in the solution file writer.
- Fixed some bugs in the documentation.
- Fixed a bug in the conic optimizer occurring when using nondefault tolerances.
- Fixed a bug that caused an assert in very rare cases. The dual simplex is particular affected by this bug.
- The function `relaxprimal` has been deprecated and replaced by the function `primalrepair`.

7.0.0.49

- Fixed an issue that caused an assert in the presolve on badly scaled problems.

7.0.0.48

- The MPS reader is now a single pass reader.
- More frequent callbacks in the MPS reader.
- The task reader and writer no longer ignore a nonzero constant in the objective.

7.0.0.47

- Tuned the numerical performance on linear problems.

7.0.0.46

- Fixed an issue related to the response handling when a custom response handler is defined.

7.0.0.45

- Removed debug print out.

7.0.0.44

- Fixed a bug in the mixed-integer conic optimizer.

7.0.0.43

- Fixed a bug in that made the convex optimizer crash in certain cases.
- Fixed a bug in the mixed-integer optimizer.

7.0.0.42

- Fixed several bugs in the function `getinfeasiblesubproblem`.
- Fixed a bug in the function `getdviolcones`.

7.0.0.41

- Fixed bug in the task writer and reader appearing on large problems.
- Fixed a bug in the function `getdviolcones`.

7.0.0.40

- Fixed bug causing a crash of mixed-integer quadratic problems.
- Deprecated the function `getsolutioninf`. Use the function `getsolutioninfo` instead.

7.0.0.38

- Fixed several minor bugs.

- Added the functions `putacolslice` and `putarowslice`.
- Fixed some recently introduced bugs in the LP file writer.
- Fixed a bug in the ctrl-c handling in the optimization toolbox for MATLAB.

7.0.0.37

- Changed the stopping the criteria for interior-point optimizers for linear and conic optimization.
- Tuned the interior-point optimizer for case with a few dense columns.

7.0.0.36

- Improved performance on some problems with a few dense columns.

7.0.0.35

- Changed the LP file write so it changes the names into valid names when writing.

7.0.0.34

- Fixed some bugs in the function `analyzeproblem`.
- Fixed a bug in the conic optimizer.

7.0.0.33

- Fixed a rarely occurring in the presolve.
- Fixed in the LP writer regarding what is legal LP names.

7.0.0.32

- Minor internal changes.
- Fixed a bug in the function `appendvars`.

7.0.0.31

- Changed the way the interior-point optimizer scales conic problems. In particular problems having symmetric matrix variables was not scaled.
- Adjusted the stopping criteria in the conic interior-point optimizer.
- Fixed a number of bugs in the mixed-integer optimizer.
- Fixed a number of bugs in the problem analyzer.
- Finalized the documentation for the Fusion interfaces.

7.0.0.30

- Added a function that can analyze the names for validity. For instance the function can be used to check whether the names are valid LP file names.

7.0.0.28

- Fixed several bugs in the conic optimizer appearing on infeasible problems.
- Fixed a bug in the MPS reader occurring in some cases for problems having quadratic cones.
- Added a couple of new functions for inputting conic constraints.

7.0.0.27

- Fixed a bug the MATLAB toolbox.
- Fixed a bug the OPF reader and writer.

7.0.0.26

- Fixed a bug in the conic optimizer.
- Fixed several bugs in the mixed integer optimizer.

7.0.0.19

- Fixed a problem in the threading on Windows. It would make MOSEK hang in certain cases.

7.0.0.18

- The parameter `iparam.intpnt_num_threads` is removed. Use the parameter `iparam.num_threads` instead.

7.0.0.17

- Fixed two bugs in the optimizer for conic problems.

7.0.0.16

- Fixed an infrequently occurring bug in the presolve in linear dependency checker.

7.0.0.10

- Fixed a bug in the function `removescones`.
- Fixed a bug in the LU factorization.
- Fixed a number of bugs in the mixed-integer optimizer.
- Made the presolve a lot faster in some special cases.

7.0.0.8

- Updated the AMPL binary.
- Fixed a bug in the conic optimizer that made it report incorrect objective values in the log output in certain cases.

7.0.0.3

- Improved the network detection method.