CCosmo: A Conic First-Order Solver

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***Abstract*—In robotics, convex optimization solvers frequently appear inside larger loops that repeatedly solve closely related problems and only require moderate accuracy. This operating regime favors first-order methods that are easily warm started and have predictable memory requirements. We present `CCosmo`, a family of general-purpose conic optimization solvers based on the alternating direction method of multipliers. `CCosmo` is written in `C++` with a `Python` interface. It supports both single- and double-precision arithmetic and can dispatch to either sparse or dense linear algebra backends. It implements the same base algorithm as `COSMO.jl` [1] for conic programs and reduces to `OSQP` [2] when solving a QP. We evaluate `CCosmo` on standard QP and SOCP benchmarks and find that `CCosmo` is broadly competitive with the open-source baselines on every family. On a synthetic MPC benchmark, `CCosmo` gives the fastest warm-starting performance, beating out `SCS`, another popular first-order solver, and `Clarabel`, an interior point solver. Finally, on a benchmark of Graph of Convex Sets relaxations, we show the benefit of avoiding `SCS`'s homogeneous embedding when the original problem is already homogeneous.**

I. Introduction

Convex optimization appears throughout robotics, but in markedly different forms: small quadratic programs arise in online control and reduced-order MPC [3–7]; moderately sized second-order cone programs arise naturally in contact-rich planning and grasping problems [8–10]; and larger structured conic problems arise in trajectory optimization, perception, and motion planning [11–16].

In many of these applications, planners, controllers, and estimators repeatedly solve closely related instances and require reliable moderate-accuracy solutions with low latency. This setting favors first-order methods, which have low memory requirements, are naturally warm started, and often converge rapidly to the accuracy required in the outer loop [2, 7, 17]. As a result, `OSQP` became a widely used open-source QP solver in robotics-adjacent software stacks such as Drake and CasADi [18, 19].

Building on `OSQP`, `COSMO.jl` generalized `OSQP`'s operator-splitting approach to conic programs for which projection onto the cone can be computed efficiently [1, 20]. Another widely used open-source alternative is `SCS`, which solves a homogeneous embedding of the conic problem [17, 21]. This embedding gives a uniform treatment of optimality and infeasibility certificates and often improves robustness, but it also enlarges the linear system that must be solved at each iteration, potentially slowing down the solver. In workloads where feasibility is expected and the same problem family is solved repeatedly, or in situations where the problem is already homogeneous, it can be advantageous to avoid that extra embedding.

In this work, we introduce `CCosmo`, a family of general-purpose conic optimization solvers based on the same algorithm as `OSQP` and `COSMO.jl`. Written in `C++` with a `Python` interface, `CCosmo` supports both sparse and dense backends, single and double precision arithmetic, and practical enhancements such as scaling, restarts, warm starts, and primal/dual infeasibility detection. `CCosmo` is designed to be highly configurable, allowing the specification of programs in both the typical conic standard form and more abstract formats to enable dispatching to more specialized linear algebra backends. In this workshop paper, we will focus only on the standard form, and save evaluations for more abstract inputs in a follow-up paper.

We evaluate `CCosmo` on two conic benchmarks, the Maros-Meszaros QP benchmark [22] and the Mittelmann SOCP benchmark [23] from the 7th DIMACS challenge [24]. We additionally evaluate `CCosmo` on two robotics-focused tasks; a locomotion MPC task with second-order cone constraints to test `CCosmo`'s warm-start performance; and a benchmark of Graph of Convex Sets (GCS) [25, 26] to demonstrate the advantage of `CCosmo` on typical convex relaxations found in robotics.

II. Problem Formulation and Method

Let $\mathbb{V}$ and $\mathbb{W}$ be vector spaces. Let $x \in \mathbb{V}$, $\mathcal{A} : \mathbb{V} \to \mathbb{W}$ be a linear operator, $b \in \mathbb{W}$, and $\mathcal{K} \subseteq \mathbb{W}$ be a convex cone. We let $q \in \mathbb{V}^*$ be a linear functional on $\mathbb{V}$ and $\mathcal{P} : \mathbb{V} \to \mathbb{R}$ be a convex quadratic function. We are interested in solving

$$\begin{aligned} &\min\ \mathcal{P}(x) + \langle q, x\rangle \\ &\text{s.t. } \mathcal{A}(x) - b \in \mathcal{K} \end{aligned} \tag{1}$$

The formulation in (1) provides a flexible description of conic optimization problems including the typical standard form used by most papers [1, 17, 27].

Example 1 (Standard Form)**.** *Choosing $\mathbb{V} = \mathbb{R}^n$, $\mathbb{W} = \mathbb{R}^m$ and providing explicit matrix representations of $\mathcal{P}$ and $\mathcal{A}$ results in the typical standard form:*

$$\begin{aligned} &\min\ \frac{1}{2}x^T P x + q^T x \\ &\text{s.t. } Ax - b \in \mathcal{K} \end{aligned} \tag{2}$$

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Example 2 (Matrix Standard Form)**.** *A natural standard form for sums-of-squares relaxations, which are increasingly popular in robotics [9, 16, 26], is*

$$\begin{aligned} &\min \ \frac{1}{2}\boldsymbol{tr}(X^T P_l X P_r) + \boldsymbol{tr}(Q^T X) \\ &\text{s.t. } A_i X B_i - C_i \in \mathcal{K}_i \end{aligned} \tag{3}$$

While every instance of (3) can be converted to (2), keeping our problem as close to its natural formulation as possible may help improve the performance of some steps of our algorithm.

Our algorithm applies the alternating direction method of multipliers [28, 29] to the reformulation

$$\begin{aligned} &\min \ \mathcal{P}(x) + \langle q, x\rangle + \mathbb{1}(\mathcal{A}(x) - b = s) + \mathbb{1}(\tilde{s} \in \mathcal{K}) \\ &\text{s.t. } (x, s) = (\tilde{x}, \tilde{s}), \end{aligned} \tag{4}$$

where $\mathbb{1}$ is the indicator function that takes value ∞ if the condition is not satisfied.

After choosing appropriate positive definite quadratic forms $\mathcal{D}_x : \mathbb{V} \to \mathbb{R}$ and $\mathcal{D}_s : \mathbb{W} \to \mathbb{R}$, the steps of our algorithm are outlined in Algorithm 1. Typically, $\mathcal{D}_x$ and $\mathcal{D}_s$ are taken as diagonal matrices to avoid disturbing the sparsity pattern of the original problem. The main computational steps are line 2 which involves solving a linear system and line 3 which involves projection onto a (scaled) cone. The linear system solve is typically the most expensive step.

A. Solving the Linear System

Line 2 can be computed by solving the linear system

$$\begin{bmatrix} \nabla\mathcal{P} + \nabla\mathcal{D}_x & \mathcal{A}^* \\ \mathcal{A} & -\nabla\mathcal{D}_s^{-1} \end{bmatrix} \begin{bmatrix} x \\ \lambda \end{bmatrix} = \begin{bmatrix} -q + \nabla\mathcal{D}_x(\tilde{x}^k) \\ b - \tilde{s}^k + u^k \end{bmatrix} \tag{5}$$

$$s = \mathcal{A}(x) - b \tag{6}$$

where λ is the dual variable associated to the equality constrained QP in line 2.

For problems given in the standard form (2), `CCosmo` solves (5) using a direct factorization whose left-hand side can be cached across ADMM iterations. If the problem data are available only through operator access or are too large for a direct factorization to be attractive, the same structure also admits iterative Krylov methods such as GMINRES [30–32].

B. Cone Projection Step

`CCosmo` accepts the cone $\mathcal{K}$ as the product of simpler cones $\mathcal{K} = \mathcal{K}_1 \times \cdots \times \mathcal{K}_N$. We choose $\mathcal{D}_s$ to factor according to the cone structure. If a factor $\mathcal{D}_{s_i}$ is chosen so that $s_i \in \mathcal{K}_i \implies \mathcal{D}_{s_i}(s_i) \in \mathcal{K}_i$, such as when $\mathcal{D}_{s_i}$ is a scaled multiple of the identity, line 3 reduces to Euclidean projection onto the cone $\mathcal{K}_i$. For some cones more general $\mathcal{D}_{s_i}$ can be chosen while still admitting an efficient solution to line 3 [33, 34].

C. Convergence Checking

We terminate when the primal and dual residuals are small and additionally require the duality gap to be small. The duality gap being small is not included in the original `COSMO.jl` and `OSQP` termination criterion, but improves solver robustness at the cost of occasionally requiring more iterations. As in `COSMO.jl` and related ADMM solvers, one-step iterate differences can also be used to detect primal and dual infeasibility [1, 35, 36].

D. Acceleration

Algorithm 1 has several hyperparameters: the choices of α, $\mathcal{D}_x$, and $\mathcal{D}_s$ all affect the convergence. The performance of first-order methods is well-known to be quite sensitive to the choice of their parameters [37]. Moreover, while Algorithm 1 is quite simple conceptually, it is amenable to a wide family of acceleration techniques including Anderson Acceleration [20, 38], Halpern Iteration [39, 40], and restarts [41, 42]. `COSMO.jl` and `SCS` implement Anderson Acceleration and adaptive selection of $\mathcal{D}_x$ and $\mathcal{D}_s$. Currently, `CCosmo` only implements adaptive selection of $\mathcal{D}_s$ and $\mathcal{D}_x$. Acceleration based on Halpern iteration and restarts is in development.

III. Experiments

We compare `CCosmo` against `Clarabel` [27], `SCS` [17, 21], and `COSMO.jl` [1], and include `OSQP` [2] on QP benchmarks. Because the acceleration features of `CCosmo` are still in development, we also compare to `SCS` and `COSMO.jl` with acceleration disabled; we call these the unenhanced versions. All problem instances are parsed using `CVXPY`, except some GCS problems which are parsed using `Drake`. Experiments are run on an 11th Gen Intel Core i9-11980HK CPU with 64 GiB RAM to absolute and relative error tolerances of 10^{-3} and 10^{-4} with a 10k iteration limit and a timeout of 1 hour.

A. Standard Benchmarks

We begin by evaluating the solvers' performance on two challenging benchmarks: 138 QPs from the Maros-Meszaros benchmark [22] and the 16 smallest SOCP instances[1] from the 7th DIMACS challenge [24] hosted on the Mittelmann benchmark [23]. All solvers are run with absolute and relative tolerances of 10^{-3} and 10^{-4}. When a solver returns a solution, we check whether the returned cost is within 5 times the relative tolerance of the known solution. If it is not, we declare the result a failure. If a solver fails, its reported time to solve an instance is set to the time limit.

We report absolute performance profiles for both the Maros-Meszaros benchmark in Figure 1 and the Mittelmann benchmark in Figure 2. These profiles show the fraction of instances a solver succeeds in solving within a specified time window [27]. We also report the shifted geometric mean [23], a standard metric for comparing solver performance, for the Maros-Meszaros benchmark in Table I and the Mittelmann SOCP benchmark in Table II.

The results show that `CCosmo` is competitive with other open-source first-order solvers, outperforming `OSQP` and the `Julia` implementation of `COSMO.jl` with its acceleration features turned off. It also outperforms all variants of `COSMO.jl` and `SCS` on the smaller problems. Due to the

[1]Problems `nql180` and `qssp180` are too large for the hardware of the test machine

Algorithm 1: `CCosmo` base algorithm

Input: Initial values $(\tilde{x}^0, \tilde{s}^0, u^0)$, relaxation parameter $\alpha \in (0, 2)$, quadratic penalty functions $\mathcal{D}_x$ and $\mathcal{D}_s$

while *not converged* **do**

$(x^{k+1}, s^{k+1}) \leftarrow \operatorname{argmin}_{\mathcal{A}(x)-b=s} \; \mathcal{P}(x) + \langle q, x \rangle + \mathcal{D}_x(x - \tilde{x}^k) + \mathcal{D}_s(s - \tilde{s}^k - u^k)$;

$(\tilde{x}^{k+1}, \tilde{s}^{k+1}) \leftarrow \operatorname{argmin}_{\tilde{s} \in \mathcal{K}} \mathcal{D}_x(\alpha x^{k+1} + (1-\alpha)\tilde{x}^k - \tilde{x}) + \mathcal{D}_s(\alpha s^{k+1} + (1-\alpha)\tilde{s}^k - \tilde{s})$;

$u^{k+1} \leftarrow u^k + \left(\alpha s^{k+1} + (1-\alpha)\tilde{s}^k - \tilde{s}^{k+1}\right)$;

$k \leftarrow k + 1$;

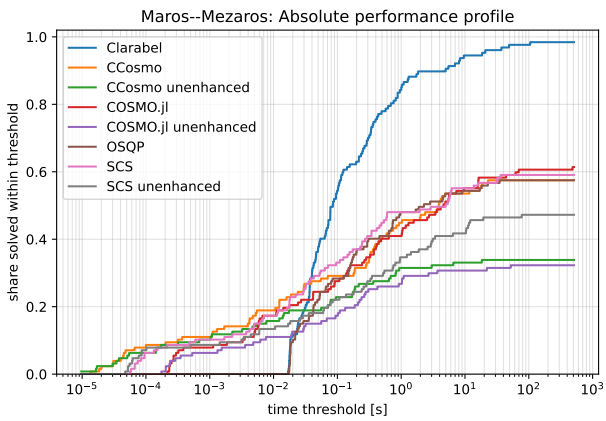

Fig. 1: Maros-Meszaros QP absolute performance profile.

Solver	Success rate	Shifted GM [s]
`Clarabel`	125/138 (90.6%)	2.21
`COSMO.jl`	78/138 (56.5%)	6.10×10^1
`SCS`	75/138 (54.3%)	6.24×10^1
`OSQP`	73/138 (52.9%)	6.88×10^1
`CCosmo`	73/138 (52.9%)	7.05×10^1
`SCS` unenhanced	60/138 (43.5%)	1.59×10^2
`CCosmo` unenhanced	43/138 (31.2%)	3.72×10^2
`COSMO.jl` unenhanced	41/138 (29.7%)	4.35×10^2

TABLE I: Shifted geometric mean and Success Rate of each solver on the Maros-Meszaros QPs sorted by shifted geometric mean.

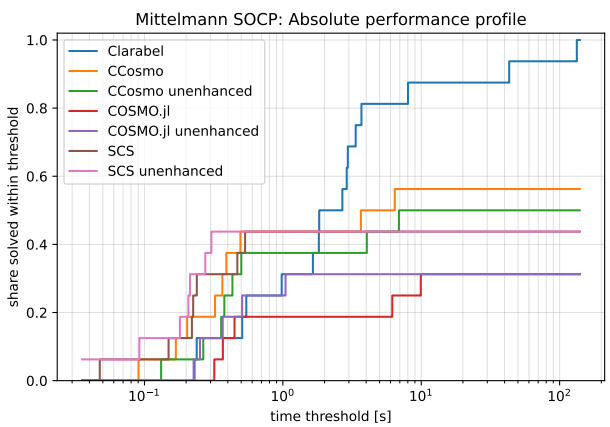

Fig. 2: Mittelmann SOCP absolute performance profile.

Solver	Success rate	Shifted GM [s]
`Clarabel`	16/16 (100.0%)	3.20
`CCosmo`	9/16 (56.2%)	3.14×10^1
`CCosmo` unenhanced	8/16 (50.0%)	5.03×10^1
`SCS` unenhanced	7/16 (43.8%)	6.06×10^1
`SCS`	7/16 (43.8%)	6.23×10^1
`COSMO.jl` unenhanced	5/16 (31.2%)	1.57×10^2
`COSMO.jl`	5/16 (31.2%)	1.95×10^2

TABLE II: Shifted geometric mean and Success Rate of each solver on the Mittelmann SOCP benchmark sorted by shifted geometric mean.

challenging nature of these problems, the more robust second-order interior point solver `Clarabel` outperforms the first-order solvers in terms of problems solved. However, when they do succeed, first-order solvers typically return solutions more quickly. A complete list of the solvers' performance on each problem instance is included in Appendix B and Appendix C.

B. Fixed Contact-Schedule Centroidal Locomotion MPC

We consider a repeated fixed contact-schedule centroidal locomotion MPC benchmark similar to [43] and [44, Chpt. 5, Chpt. 7]. We model friction at the feet using second-order cones, which yields a sequence of related SOCPs. Across a rollout, consecutive problems differ only through the shifted state and reference data, making this a natural setting for warm starting. Each problem in the benchmark has 1340 variables and 1556 constraints, and we evaluate both a nominal-tracking rollout and a push-recovery rollout. For details, see Appendix A.

We compare the performance of `CCosmo`, `SCS`, and `Clarabel` on this task, warm starting `CCosmo` and `SCS` from the previous solution. In the nominal-tracking rollout, `CCosmo` attains a median solve time of 2.13 ms with interquartile range 0.05 ms, compared with 3.10 ms and 1.04 ms for `SCS` and 4.78 ms and 1.84 ms for `Clarabel`. In the push-recovery rollout, `CCosmo` attains a median of 5.40 ms with interquartile range 0.18 ms, compared with 6.24 ms and 0.58 ms for `SCS` and 10.66 ms and 4.13 ms for `Clarabel`. These results are summarized in Figure 3.

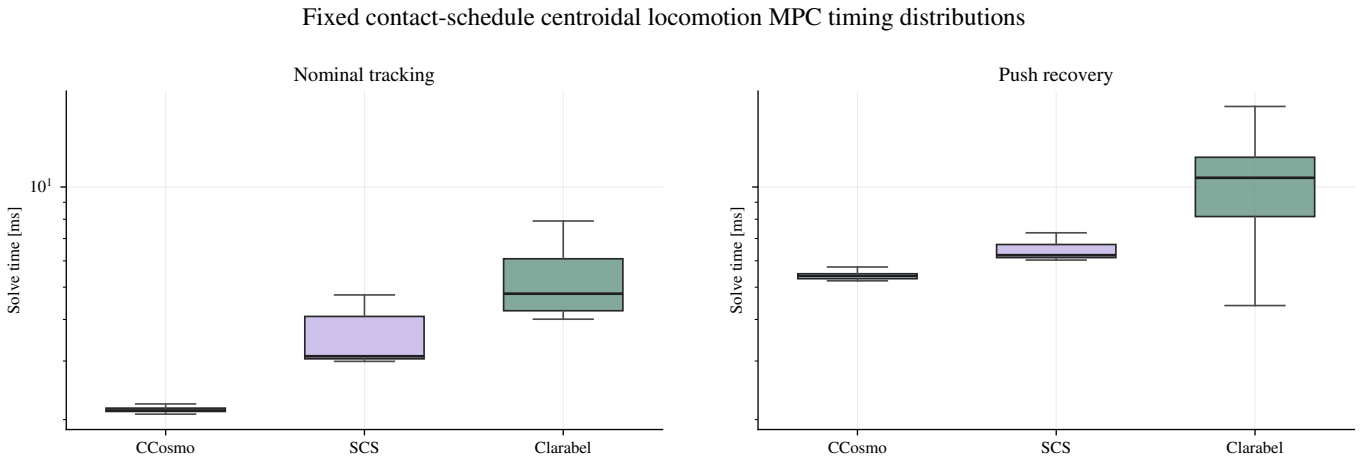

Fig. 3: Solver-reported timing distributions for the fixed contact-schedule locomotion MPC benchmark. Each box summarizes all repeated solves in one rollout regime, including the first solve. The vertical axis is logarithmic.

TABLE III: Shifted Geometric Mean and Success Rate for the GCS conic benchmark.

Solver	Success rate	Shifted GM [s]
Clarabel	9/9 (100.0%)	6.13
CCosmo	6/9 (66.7%)	6.52×10^1
COSMO.jl	5/9 (55.6%)	8.99×10^1
SCS	2/9 (22.2%)	3.62×10^2

C. GCS Conic Benchmark

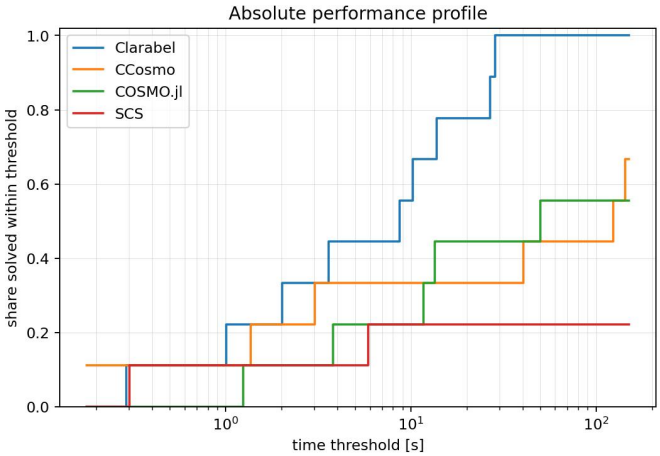

Fig. 4: Absolute performance profile for the GCS conic benchmark.

Finally, we consider a benchmark of convex relaxations of shortest path problems in a GCS [26]. Such instances model a variety of motion planning problems from [9, 45–47].

These problems are challenging for first-order methods as they have many near-optimal solutions, which is known to be adversarial to first-order methods [41, 48]. Additionally, they are already naturally homogeneous, which leads to poor interaction with the homogeneous embedding favored by most solvers such as `SCS`. On this subset we compare `CCosmo`, `COSMO.jl`, `SCS`, and `Clarabel` on the same conic instances. First-order solvers that do not match `Clarabel`'s optimal cost within $5e-3$ are discarded. This occurs for some instances that `COSMO.jl` reports as solved, due to the failure of checking the duality gap in its termination criteria. The performance profile for these instances is reported in Figure 4 and success rates and shifted geometric means are reported in Table III. A detailed breakdown of each solver's performance can be found in Appendix D.

These problems are also numerically challenging for first-order methods and so `Clarabel` is once again the most robust solver. However, among the first-order methods, `CCosmo` performs quite well, beating out `SCS` in both robustness and speed, while performing comparably to `COSMO.jl`. `SCS` seems to suffer from the effects of homogenizing an already homogeneous problem, requiring more iterations than `CCosmo` on every instance it solves besides one of the simple mazes. On the other hand, `COSMO.jl` seems to benefit substantially on these problem instances from its acceleration features, requiring either as many, or dramatically fewer, iterations than `CCosmo` on almost every instance. In future work, `CCosmo` expects to integrate similar acceleration features.

IV. Conclusion and Future Work

We presented `CCosmo`, an ADMM-based conic solver implemented in `C++` with a `Python` interface, multiple numerical backends and precisions, and a design aimed at warm-started repeated solves. Our experiments show that our preliminary implementation is broadly competitive with other open-source, first-order solvers on a variety of conic benchmarks and enjoys strong warm-starting performance.

Future work will explore various modern acceleration techniques such as restarts, Halpern iteration, and mixed-precision arithmetic to further improve the performance of `CCosmo`. We also plan to add structured backends for matrix programs and batches of related optimization problems common in robotics. An open source release is planned in the near future.

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Appendix A
Locomotion MPC Benchmark Details

The repeated locomotion benchmark uses planar center-of-mass state (c_t, v_t) with $c_t \in \mathbb{R}^2$, $v_t \in \mathbb{R}^2$, and contact forces $f_{i,t} = (f_{ix,t}, f_{iy,t}, f_{iz,t}) \in \mathbb{R}^3$ at stage-dependent foothold locations $p_{i,t} \in \mathbb{R}^3$. For one MPC solve, the decision variables are the state trajectory $\{c_t, v_t\}_{t=0}^{H}$ and the contact-force trajectory $\{f_{i,t}\}_{t=0}^{H-1}$.

For time step Δt, mass m, and per-stage force reference $\hat{f}_t$, each convex subproblem solves

$$
\begin{aligned}
\min \quad & \sum_{t=0}^{H} \tfrac{w_c}{2}\|c_t - c_t^{\mathrm{ref}}\|_2^2 + \sum_{t=0}^{H} \tfrac{w_v}{2}\|v_t - v_t^{\mathrm{ref}}\|_2^2 \\
& \quad + \sum_{t=0}^{H-1} \tfrac{w_{\mathrm{ref}}}{2}\|f_t - \hat{f}_t\|_2^2 + \sum_{t=0}^{H-1} \tfrac{w_f}{2}\|f_t\|_2^2 \\
& \quad + \sum_{t=1}^{H-1} \tfrac{w_{\Delta f}}{2}\|f_t - f_{t-1}\|_2^2 \\
\text{s.t.} \quad & c_{t+1} = c_t + \Delta t\, v_t, \\
& v_{t+1} = v_t + \Delta t\, \tfrac{1}{m} \sum_{i=1}^{m} (f_{ix,t}, f_{iy,t}), \\
& \sum_{i=1}^{m} f_{iz,t} = mg, \\
& c_0 = c_{\mathrm{init}}^{(k)}, \quad v_0 = v_{\mathrm{init}}^{(k)}, \\
& \|(f_{ix,t}, f_{iy,t})\|_2 \le \mu f_{iz,t}, \qquad \forall i, t, \\
& 0 \le f_{iz,t} \le \bar{f}_{iz,t}, \qquad \forall i, t.
\end{aligned}
\tag{7}
$$

The paper configuration uses $H = 24$, a rollout length of 48 repeated MPC solves per regime, $\Delta t = 0.14\,\mathrm{s}$, $m = 24\,\mathrm{kg}$, $\mu = 0.55$, and active-contact normal-force bound $\bar{f}_{iz,t} = 94.176\,\mathrm{N}$. Swing feet use $\bar{f}_{iz,t} = 0$. The objective weights are

$$
\begin{aligned}
& w_c = 12.0, \qquad w_v = 2.5, \qquad w_{\mathrm{ref}} = 0.08, \\
& w_f = 0.002, \qquad\qquad\qquad w_{\Delta f} = 0.020.
\end{aligned}
$$

The initial footholds are

$$
\begin{aligned}
& p_1 = (0.30, 0.20, 0), \qquad p_2 = (0.30, -0.20, 0), \\
& p_3 = (-0.28, 0.20, 0), \qquad p_4 = (-0.28, -0.20, 0).
\end{aligned}
$$

The rollout starts from center of mass $(0, 0, 0.48)$ and tracks a forward transfer to $(0.72, 0, 0.48)$. On odd global stages, one foot is deactivated in the order $1, 4, 2, 3$ and lands one stage later after a $0.10\,\mathrm{m}$ forward step. Two regimes are used. In the nominal-tracking regime, the MPC initial state follows the reference rollout. In the push-recovery regime, deterministic velocity disturbances are injected at global stages 12, 24, and 36, and the MPC initial state is shifted by the resulting simulated center-of-mass error. At rollout index k, the MPC initial state $(c_{\mathrm{init}}^{(k)}, v_{\mathrm{init}}^{(k)})$ and the horizon references $(c_t^{\mathrm{ref}}, v_t^{\mathrm{ref}})$ are obtained by shifting a common global reference trajectory forward by k stages.

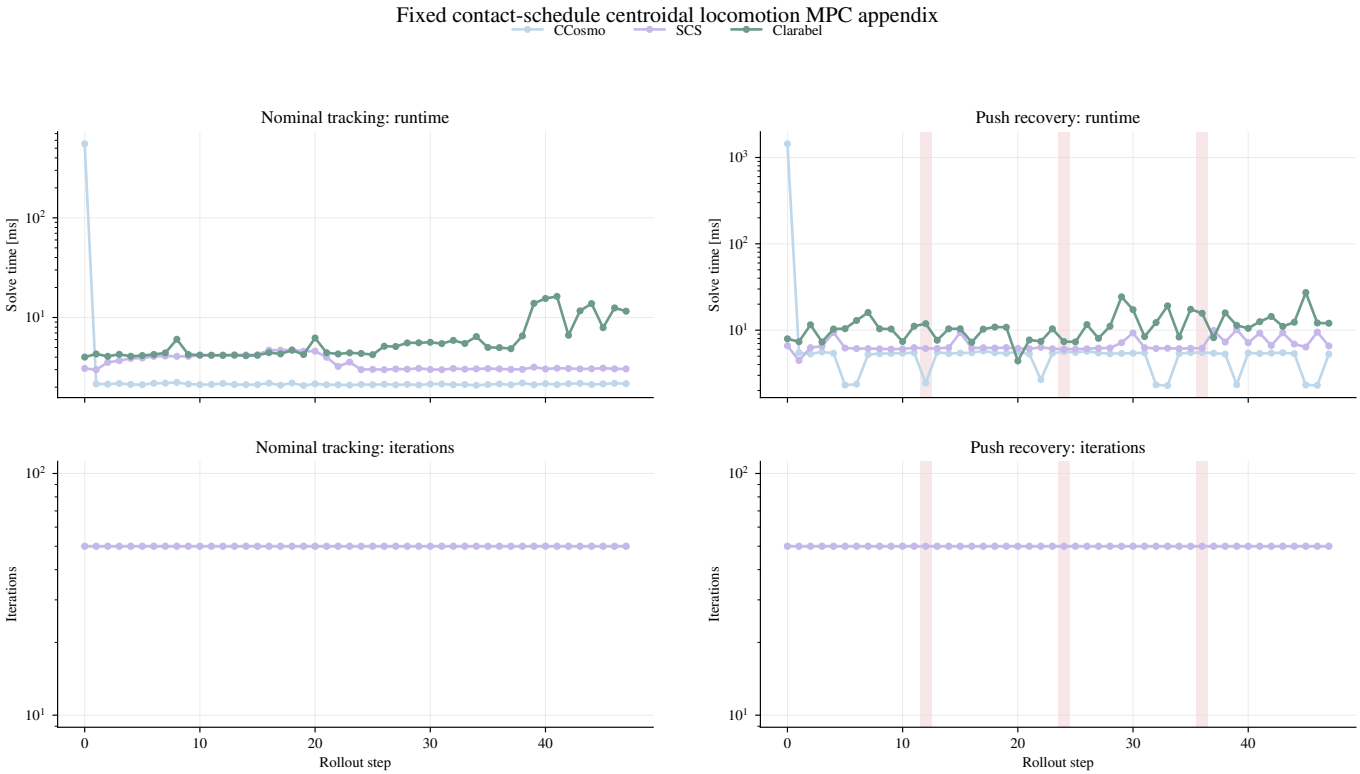

Fig. 5: Locomotion MPC benchmark showing per-solve runtime and iteration traces for the nominal-tracking and push-recovery regimes. Red bars indicate where the pushes occurred in the trajectory. Iterations are only shown for first-order solvers.

APPENDIX B
MITTELMANN SOCP BENCHMARK DETAILS

TABLE IV: Results on the 16 smallest Mittelmann SOCP instances.

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
nql30	Clarabel	optimal	optimal	3.69676	9.300×10^{-7}	9.830×10^{-7}
nql30	SCS	optimal	optimal	0.0475213	2.254×10^{-4}	2.382×10^{-4}
nql30	CCosmo	optimal	optimal	0.0906008	2.322×10^{-4}	2.454×10^{-4}
nql30	CCosmo unenhanced	optimal	optimal	0.131921	2.322×10^{-4}	2.454×10^{-4}
nql30	COSMO.jl	optimal	optimal	6.1772	5.412×10^{-4}	5.721×10^{-4}
nql30	COSMO.jl unenhanced	optimal	optimal	0.367736	2.061×10^{-4}	2.179×10^{-4}
nql30	SCS unenhanced	optimal	optimal	0.0354109	2.242×10^{-4}	2.370×10^{-4}
sched_50_50_orig	Clarabel	optimal	optimal	0.238331	0.224045	8.400×10^{-6}
sched_50_50_orig	SCS	optimal	failed	1.35046	3400	0.12747
sched_50_50_orig	CCosmo	max_iters	failed	4.69593	26651.2	0.999183
sched_50_50_orig	CCosmo unenhanced	max_iters	failed	5.02498	26673	1
sched_50_50_orig	COSMO.jl	max_iters	failed	9.75319	23008.6	0.862619
sched_50_50_orig	COSMO.jl unenhanced	max_iters	failed	3.13373	26673	1
sched_50_50_orig	SCS unenhanced	optimal	failed	2.63188	26673	1
sched_50_50_scaled	Clarabel	optimal	optimal	0.229993	5.075×10^{-7}	6.463×10^{-8}
sched_50_50_scaled	SCS	optimal	optimal	0.149274	3.319×10^{-3}	4.227×10^{-4}
sched_50_50_scaled	CCosmo	optimal	optimal	0.168503	5.751×10^{-5}	7.325×10^{-6}
sched_50_50_scaled	CCosmo unenhanced	max_iters	failed	6.10349	1.754×10^{-3}	2.233×10^{-4}
sched_50_50_scaled	COSMO.jl	optimal	failed	0.825442	0.0240983	3.069×10^{-3}
sched_50_50_scaled	COSMO.jl unenhanced	optimal	failed	0.990249	0.651476	0.082969
sched_50_50_scaled	SCS unenhanced	optimal	optimal	0.304254	8.556×10^{-4}	1.090×10^{-4}
qssp30	Clarabel	optimal	optimal	8.0211	5.334×10^{-6}	8.211×10^{-7}
qssp30	SCS	optimal	failed	0.0951226	0.0132994	2.047×10^{-3}
qssp30	CCosmo	optimal	optimal	0.20337	5.755×10^{-4}	8.858×10^{-5}
qssp30	CCosmo unenhanced	optimal	optimal	0.265975	5.755×10^{-4}	8.858×10^{-5}
qssp30	COSMO.jl	optimal	failed	1.8249	0.0338891	5.216×10^{-3}
qssp30	COSMO.jl unenhanced	optimal	optimal	0.251903	1.500×10^{-3}	2.308×10^{-4}
qssp30	SCS unenhanced	optimal	optimal	0.0917812	2.087×10^{-3}	3.212×10^{-4}
sched_100_50_orig	Clarabel	optimal	optimal	0.544159	1.73431	9.535×10^{-6}
sched_100_50_orig	SCS	optimal	failed	1.78795	1.293×10^{5}	0.710719
sched_100_50_orig	CCosmo	max_iters	failed	6.69068	1.482×10^{5}	0.814849
sched_100_50_orig	CCosmo unenhanced	max_iters	failed	7.45791	1.819×10^{5}	1

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
sched_100_50_orig	COSMO.jl	optimal	failed	5.76758	1.819×10^{5}	1
sched_100_50_orig	COSMO.jl unenhanced	max_iters	failed	6.42247	1.819×10^{5}	1
sched_100_50_orig	SCS unenhanced	optimal	failed	5.85443	81678.7	0.449058
sched_100_50_scaled	Clarabel	optimal	optimal	0.50828	8.460×10^{-4}	1.260×10^{-5}
sched_100_50_scaled	SCS	unknown	failed	6.95912	21.9774	0.327209
sched_100_50_scaled	CCosmo	max_iters	failed	7.23089	20.8962	0.311112
sched_100_50_scaled	CCosmo unenhanced	max_iters	failed	7.19628	16.1287	0.240131
sched_100_50_scaled	COSMO.jl	optimal	failed	8.81452	3906.62	58.1634
sched_100_50_scaled	COSMO.jl unenhanced	max_iters	failed	6.2166	16.1285	0.240128
sched_100_50_scaled	SCS unenhanced	optimal	failed	4.80101	33.3689	0.49681
nql60	Clarabel	optimal	optimal	43.218	3.717×10^{-4}	3.974×10^{-4}
nql60	SCS	optimal	optimal	0.533523	1.092×10^{-3}	1.167×10^{-3}
nql60	CCosmo	optimal	optimal	0.390332	1.228×10^{-3}	1.312×10^{-3}
nql60	CCosmo unenhanced	optimal	optimal	0.377508	1.228×10^{-3}	1.312×10^{-3}
nql60	COSMO.jl	optimal	optimal	9.92584	3.968×10^{-4}	4.242×10^{-4}
nql60	COSMO.jl unenhanced	optimal	optimal	1.04553	1.222×10^{-3}	1.307×10^{-3}
nql60	SCS unenhanced	optimal	optimal	0.275126	1.171×10^{-3}	1.252×10^{-3}
sched_100_100_orig	Clarabel	optimal	optimal	1.64849	7.26909	1.013×10^{-5}
sched_100_100_orig	SCS	optimal	failed	8.85201	4.362×10^{5}	0.608079
sched_100_100_orig	CCosmo	max_iters	failed	12.4743	7.174×10^{5}	1
sched_100_100_orig	CCosmo unenhanced	max_iters	failed	12.8324	7.174×10^{5}	1
sched_100_100_orig	COSMO.jl	max_iters	failed	43.2838	7.174×10^{5}	1
sched_100_100_orig	COSMO.jl unenhanced	max_iters	failed	18.8579	7.174×10^{5}	1
sched_100_100_orig	SCS unenhanced	optimal	failed	17.2473	6.141×10^{5}	0.856008
sched_100_100_scaled	Clarabel	optimal	optimal	0.98045	5.261×10^{-4}	1.925×10^{-5}
sched_100_100_scaled	SCS	optimal	failed	3.67512	2.85645	0.104512
sched_100_100_scaled	CCosmo	max_iters	failed	28.6443	2.86108	0.104681
sched_100_100_scaled	CCosmo unenhanced	optimal	failed	5.92606	2.84799	0.104202
sched_100_100_scaled	COSMO.jl	max_iters	failed	68.8342	15.7976	0.578003
sched_100_100_scaled	COSMO.jl unenhanced	optimal	failed	1.9028	2.73944	0.10023
sched_100_100_scaled	SCS unenhanced	optimal	failed	0.495134	2.76297	0.101091
qssp60	Clarabel	optimal	optimal	133.184	4.866×10^{-6}	7.415×10^{-7}
qssp60	SCS	optimal	failed	1.11746	0.0254779	3.882×10^{-3}
qssp60	CCosmo	optimal	optimal	6.43776	6.278×10^{-4}	9.566×10^{-5}
qssp60	CCosmo unenhanced	optimal	optimal	6.89871	6.278×10^{-4}	9.566×10^{-5}
qssp60	COSMO.jl	optimal	failed	27.668	0.39433	0.0600867
qssp60	COSMO.jl unenhanced	optimal	failed	1.83776	0.0251065	3.826×10^{-3}
qssp60	SCS unenhanced	optimal	failed	1.15412	0.0242514	3.695×10^{-3}
nb	Clarabel	optimal	optimal	2.69199	9.464×10^{-8}	1.867×10^{-6}
nb	SCS	optimal	optimal	0.220186	8.990×10^{-4}	0.017731
nb	CCosmo	optimal	optimal	0.493456	4.936×10^{-4}	9.736×10^{-3}
nb	CCosmo unenhanced	optimal	optimal	0.50074	4.936×10^{-4}	9.736×10^{-3}
nb	COSMO.jl	optimal	optimal	0.319515	7.869×10^{-4}	0.0155197
nb	COSMO.jl unenhanced	optimal	failed	0.305842	0.0115564	0.227923
nb	SCS unenhanced	optimal	optimal	0.207592	2.079×10^{-4}	4.100×10^{-3}
nb_L1	Clarabel	optimal	optimal	1.83096	3.983×10^{-7}	3.061×10^{-8}
nb_L1	SCS	optimal	optimal	0.468904	8.145×10^{-3}	6.260×10^{-4}
nb_L1	CCosmo	optimal	optimal	3.66334	1.134×10^{-4}	8.713×10^{-6}
nb_L1	CCosmo unenhanced	optimal	optimal	4.04285	1.134×10^{-4}	8.713×10^{-6}
nb_L1	COSMO.jl	optimal	failed	0.706264	0.0639263	4.913×10^{-3}
nb_L1	COSMO.jl unenhanced	optimal	failed	0.196503	0.0283993	2.183×10^{-3}
nb_L1	SCS unenhanced	optimal	failed	0.15882	0.0475494	3.654×10^{-3}
nb_L2_bessel	Clarabel	optimal	optimal	1.81963	1.489×10^{-6}	1.451×10^{-5}
nb_L2_bessel	SCS	optimal	optimal	0.224807	2.164×10^{-5}	2.109×10^{-4}
nb_L2_bessel	CCosmo	optimal	optimal	0.323277	7.718×10^{-4}	7.524×10^{-3}
nb_L2_bessel	CCosmo unenhanced	optimal	optimal	0.358088	5.872×10^{-4}	5.725×10^{-3}
nb_L2_bessel	COSMO.jl	optimal	optimal	0.368464	2.699×10^{-3}	0.0263156
nb_L2_bessel	COSMO.jl unenhanced	optimal	optimal	0.226473	3.903×10^{-3}	0.0380474
nb_L2_bessel	SCS unenhanced	optimal	optimal	0.180237	4.834×10^{-5}	4.713×10^{-4}
sched_200_100_orig	Clarabel	optimal	optimal	3.35951	0.445119	3.149×10^{-6}
sched_200_100_orig	SCS	optimal	failed	9.15711	1.414×10^{5}	1
sched_200_100_orig	CCosmo	max_iters	failed	27.694	1.414×10^{5}	1
sched_200_100_orig	CCosmo unenhanced	max_iters	failed	24.9571	1.414×10^{5}	1
sched_200_100_orig	COSMO.jl	optimal	failed	64.4093	1.414×10^{5}	0.999999
sched_200_100_orig	COSMO.jl unenhanced	max_iters	failed	39.3051	1.414×10^{5}	1
sched_200_100_orig	SCS unenhanced	optimal	failed	27.654	1.311×10^{5}	0.927639
sched_200_100_scaled	Clarabel	optimal	optimal	2.94763	5.483×10^{-3}	1.058×10^{-4}
sched_200_100_scaled	SCS	optimal	failed	3.27115	13.2907	0.256515
sched_200_100_scaled	CCosmo	optimal	failed	2.00957	16.1933	0.312536
sched_200_100_scaled	CCosmo unenhanced	max_iters	failed	27.401	16.1576	0.311848
sched_200_100_scaled	COSMO.jl	max_iters	failed	92.7869	2926.37	56.48
sched_200_100_scaled	COSMO.jl unenhanced	optimal	failed	9.48609	15.4872	0.298909
sched_200_100_scaled	SCS unenhanced	optimal	failed	1.68797	16.1995	0.312657
nb_L2	Clarabel	optimal	optimal	2.89406	2.093×10^{-8}	1.285×10^{-8}
nb_L2	SCS	optimal	optimal	0.238792	2.624×10^{-3}	1.611×10^{-3}
nb_L2	CCosmo	optimal	optimal	0.365261	2.788×10^{-4}	1.712×10^{-4}
nb_L2	CCosmo unenhanced	optimal	optimal	0.431934	4.687×10^{-4}	2.877×10^{-4}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
nb_L2	COSMO.jl	optimal	optimal	0.447453	5.978×10^{-4}	3.670×10^{-4}
nb_L2	COSMO.jl unenhanced	optimal	optimal	0.507553	3.752×10^{-3}	2.303×10^{-3}
nb_L2	SCS unenhanced	optimal	optimal	0.21329	2.692×10^{-3}	1.652×10^{-3}

APPENDIX C
MAROS-MESZAROS BENCHMARK DETAILS

TABLE V: Maros–Meszaros Benchmark Results.

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
HS21	Clarabel	optimal	optimal	0.0199799	9.911×10^{-8}	9.915×10^{-10}
HS21	SCS	optimal	optimal	2.135×10^{-4}	2.290×10^{-6}	2.291×10^{-8}
HS21	OSQP	optimal	optimal	0.0217941	10.000×10^{-8}	1.000×10^{-9}
HS21	CCosmo	optimal	optimal	1.002×10^{-4}	9.281×10^{-8}	9.285×10^{-10}
HS21	CCosmo unenhanced	optimal	optimal	3.189×10^{-4}	4.042×10^{-6}	4.043×10^{-8}
HS21	COSMO.jl	optimal	optimal	16.1451	10.000×10^{-8}	1.000×10^{-9}
HS21	COSMO.jl unenhanced	optimal	optimal	0.239084	1.386×10^{-6}	1.387×10^{-8}
HS21	SCS unenhanced	optimal	optimal	3.125×10^{-3}	1.098×10^{-7}	1.098×10^{-9}
ZECEVIC2	Clarabel	optimal	optimal	0.0177444	1.532×10^{-10}	3.713×10^{-11}
ZECEVIC2	SCS	optimal	optimal	9.499×10^{-5}	6.205×10^{-7}	1.504×10^{-7}
ZECEVIC2	OSQP	optimal	optimal	0.0184603	0	0
ZECEVIC2	CCosmo	optimal	optimal	4.391×10^{-5}	3.710×10^{-7}	8.993×10^{-8}
ZECEVIC2	CCosmo unenhanced	optimal	optimal	5.098×10^{-5}	9.362×10^{-6}	2.270×10^{-6}
ZECEVIC2	COSMO.jl	optimal	optimal	0.143139	7.824×10^{-12}	1.897×10^{-12}
ZECEVIC2	COSMO.jl unenhanced	optimal	optimal	3.490×10^{-4}	4.131×10^{-5}	1.001×10^{-5}
ZECEVIC2	SCS unenhanced	optimal	optimal	6.078×10^{-5}	1.945×10^{-5}	4.716×10^{-6}
TAME	Clarabel	optimal	optimal	0.0178584	3.471×10^{-30}	1
TAME	SCS	optimal	optimal	5.830×10^{-5}	3.471×10^{-30}	1
TAME	OSQP	optimal	optimal	0.0218931	3.471×10^{-30}	1
TAME	CCosmo	optimal	optimal	1.853×10^{-5}	3.471×10^{-30}	1
TAME	CCosmo unenhanced	optimal	optimal	1.699×10^{-5}	3.471×10^{-30}	1
TAME	COSMO.jl	optimal	optimal	3.841×10^{-4}	3.471×10^{-30}	1
TAME	COSMO.jl unenhanced	optimal	optimal	1.740×10^{-4}	3.459×10^{-30}	0.996449
TAME	SCS unenhanced	optimal	optimal	4.717×10^{-5}	3.422×10^{-30}	0.985795
QPTEST	Clarabel	optimal	optimal	0.0176877	3.097×10^{-10}	7.085×10^{-11}
QPTEST	SCS	optimal	optimal	7.443×10^{-5}	4.298×10^{-5}	9.830×10^{-6}
QPTEST	OSQP	optimal	optimal	0.0181378	8.882×10^{-16}	2.032×10^{-16}
QPTEST	CCosmo	optimal	optimal	3.052×10^{-5}	2.899×10^{-5}	6.631×10^{-6}
QPTEST	CCosmo unenhanced	optimal	optimal	3.461×10^{-5}	1.360×10^{-5}	3.110×10^{-6}
QPTEST	COSMO.jl	optimal	optimal	2.320×10^{-4}	8.882×10^{-16}	2.032×10^{-16}
QPTEST	COSMO.jl unenhanced	optimal	optimal	2.890×10^{-4}	1.446×10^{-4}	3.307×10^{-5}
QPTEST	SCS unenhanced	optimal	optimal	5.242×10^{-5}	4.471×10^{-7}	1.023×10^{-7}
HS35	Clarabel	optimal	optimal	0.0173808	7.286×10^{-9}	6.557×10^{-8}
HS35	SCS	optimal	optimal	5.577×10^{-5}	5.533×10^{-6}	4.980×10^{-5}
HS35	OSQP	optimal	optimal	0.0176734	1.111×10^{-10}	1.000×10^{-9}
HS35	CCosmo	optimal	optimal	1.342×10^{-5}	3.108×10^{-7}	2.797×10^{-6}
HS35	CCosmo unenhanced	optimal	optimal	9.688×10^{-6}	4.040×10^{-7}	3.636×10^{-6}
HS35	COSMO.jl	optimal	optimal	2.520×10^{-4}	1.111×10^{-10}	1.000×10^{-9}
HS35	COSMO.jl unenhanced	optimal	optimal	2.339×10^{-4}	2.130×10^{-9}	1.917×10^{-8}
HS35	SCS unenhanced	optimal	optimal	5.236×10^{-5}	1.936×10^{-9}	1.742×10^{-8}
HS35MOD	Clarabel	optimal	optimal	0.0182078	1.304×10^{-8}	5.215×10^{-8}
HS35MOD	SCS	optimal	optimal	9.493×10^{-5}	3.041×10^{-8}	1.216×10^{-7}
HS35MOD	OSQP	optimal	optimal	0.0184784	5.024×10^{-8}	2.010×10^{-7}
HS35MOD	CCosmo	optimal	optimal	4.049×10^{-5}	7.281×10^{-6}	2.912×10^{-5}
HS35MOD	CCosmo unenhanced	optimal	optimal	5.446×10^{-5}	3.025×10^{-5}	1.210×10^{-4}
HS35MOD	COSMO.jl	optimal	optimal	3.221×10^{-4}	10.000×10^{-10}	4.000×10^{-9}
HS35MOD	COSMO.jl unenhanced	optimal	optimal	3.581×10^{-3}	3.247×10^{-5}	1.299×10^{-4}
HS35MOD	SCS unenhanced	optimal	optimal	8.562×10^{-5}	8.161×10^{-7}	3.264×10^{-6}
HS51	Clarabel	optimal	optimal	0.0175644	8.882×10^{-16}	1
HS51	SCS	optimal	optimal	6.663×10^{-5}	8.882×10^{-16}	1
HS51	OSQP	optimal	optimal	0.0180895	2.999×10^{-25}	3.376×10^{-10}
HS51	CCosmo	optimal	optimal	2.009×10^{-5}	2.167×10^{-13}	244
HS51	CCosmo unenhanced	optimal	optimal	1.647×10^{-5}	4.254×10^{-13}	479
HS51	COSMO.jl	optimal	optimal	2.322×10^{-4}	1.776×10^{-15}	2
HS51	COSMO.jl unenhanced	optimal	optimal	2.041×10^{-4}	8.882×10^{-16}	1
HS51	SCS unenhanced	optimal	optimal	5.530×10^{-5}	8.882×10^{-16}	1
HS52	Clarabel	optimal	optimal	0.0185546	6.343×10^{-9}	1.191×10^{-9}
HS52	SCS	optimal	optimal	8.382×10^{-5}	7.073×10^{-8}	1.328×10^{-8}
HS52	OSQP	optimal	optimal	0.0186559	3.509×10^{-8}	6.588×10^{-9}
HS52	CCosmo	optimal	optimal	4.500×10^{-5}	4.652×10^{-7}	8.734×10^{-8}
HS52	CCosmo unenhanced	optimal	optimal	1.718×10^{-4}	2.250×10^{-5}	4.224×10^{-6}
HS52	COSMO.jl	optimal	optimal	2.379×10^{-4}	4.470×10^{-9}	8.392×10^{-10}
HS52	COSMO.jl unenhanced	optimal	optimal	0.263814	7.240×10^{-5}	1.359×10^{-5}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
HS52	SCS unenhanced	optimal	optimal	6.167×10^{-5}	1.289×10^{-6}	2.420×10^{-7}
HS53	Clarabel	optimal	optimal	0.0179475	4.189×10^{-9}	1.023×10^{-9}
HS53	SCS	optimal	optimal	1.522×10^{-4}	2.931×10^{-5}	7.162×10^{-6}
HS53	OSQP	optimal	optimal	0.0178674	5.305×10^{-9}	1.296×10^{-9}
HS53	CCosmo	optimal	optimal	4.789×10^{-5}	2.186×10^{-5}	5.342×10^{-6}
HS53	CCosmo unenhanced	optimal	optimal	1.472×10^{-4}	3.401×10^{-5}	8.309×10^{-6}
HS53	COSMO.jl	optimal	optimal	3.276×10^{-3}	4.186×10^{-9}	1.023×10^{-9}
HS53	COSMO.jl unenhanced	optimal	optimal	5.322×10^{-4}	7.799×10^{-4}	1.906×10^{-4}
HS53	SCS unenhanced	optimal	optimal	1.015×10^{-4}	2.780×10^{-5}	6.793×10^{-6}
HS76	Clarabel	optimal	optimal	0.0175643	6.134×10^{-9}	1.310×10^{-9}
HS76	SCS	optimal	optimal	6.685×10^{-5}	4.939×10^{-8}	1.055×10^{-8}
HS76	OSQP	optimal	optimal	0.0182753	1.818×10^{-9}	3.883×10^{-10}
HS76	CCosmo	optimal	optimal	3.078×10^{-5}	1.774×10^{-5}	3.790×10^{-6}
HS76	CCosmo unenhanced	optimal	optimal	3.762×10^{-5}	5.970×10^{-6}	1.275×10^{-6}
HS76	COSMO.jl	optimal	optimal	2.160×10^{-4}	1.818×10^{-9}	3.883×10^{-10}
HS76	COSMO.jl unenhanced	optimal	optimal	2.391×10^{-4}	1.433×10^{-5}	3.060×10^{-6}
HS76	SCS unenhanced	optimal	optimal	7.696×10^{-5}	1.260×10^{-5}	2.692×10^{-6}
HS268	Clarabel	optimal	optimal	0.0168855	8.775×10^{-6}	15.3109
HS268	SCS	optimal	failed	8.170×10^{-5}	5.192×10^{-3}	9058.66
HS268	OSQP	optimal	optimal	0.0176469	1.922×10^{-3}	3353.23
HS268	CCosmo	optimal	optimal	3.160×10^{-4}	1.543×10^{-4}	269.26
HS268	CCosmo unenhanced	optimal	optimal	1.428×10^{-4}	7.854×10^{-6}	13.7037
HS268	COSMO.jl	optimal	optimal	2.701×10^{-4}	5.731×10^{-7}	0.999908
HS268	COSMO.jl unenhanced	optimal	failed	1.791×10^{-4}	0.0117664	20530.9
HS268	SCS unenhanced	optimal	failed	7.204×10^{-5}	0.0115057	20076.1
S268	Clarabel	optimal	optimal	0.0171694	8.775×10^{-6}	15.3109
S268	SCS	optimal	failed	7.308×10^{-5}	5.192×10^{-3}	9058.66
S268	OSQP	optimal	optimal	0.0173203	1.922×10^{-3}	3353.23
S268	CCosmo	optimal	optimal	3.696×10^{-4}	1.543×10^{-4}	269.26
S268	CCosmo unenhanced	optimal	optimal	3.226×10^{-3}	7.854×10^{-6}	13.7037
S268	COSMO.jl	optimal	optimal	2.959×10^{-4}	5.731×10^{-7}	0.999908
S268	COSMO.jl unenhanced	optimal	failed	1.800×10^{-4}	0.0117664	20530.9
S268	SCS unenhanced	optimal	failed	6.329×10^{-5}	0.0115057	20076.1
GENHS28	Clarabel	optimal	optimal	0.0180703	1.797×10^{-10}	1.938×10^{-10}
GENHS28	SCS	optimal	optimal	1.331×10^{-4}	1.907×10^{-8}	2.057×10^{-8}
GENHS28	OSQP	optimal	optimal	0.0181436	3.241×10^{-7}	3.496×10^{-7}
GENHS28	CCosmo	optimal	optimal	6.635×10^{-5}	1.834×10^{-7}	1.978×10^{-7}
GENHS28	CCosmo unenhanced	optimal	optimal	2.994×10^{-5}	2.002×10^{-6}	2.160×10^{-6}
GENHS28	COSMO.jl	optimal	optimal	2.701×10^{-4}	1.699×10^{-7}	1.833×10^{-7}
GENHS28	COSMO.jl unenhanced	optimal	optimal	2.050×10^{-4}	3.377×10^{-8}	3.642×10^{-8}
GENHS28	SCS unenhanced	optimal	optimal	8.564×10^{-5}	3.806×10^{-8}	4.104×10^{-8}
HS118	Clarabel	optimal	optimal	0.0182629	1.611×10^{-6}	2.423×10^{-9}
HS118	SCS	optimal	optimal	5.898×10^{-4}	2.546×10^{-3}	3.830×10^{-6}
HS118	OSQP	optimal	optimal	0.0217994	2.000×10^{-6}	3.008×10^{-9}
HS118	CCosmo	optimal	optimal	1.106×10^{-3}	1.199×10^{-3}	1.804×10^{-6}
HS118	CCosmo unenhanced	optimal	optimal	1.077×10^{-3}	1.199×10^{-3}	1.804×10^{-6}
HS118	COSMO.jl	optimal	optimal	1.133×10^{-3}	1.531×10^{-4}	2.303×10^{-7}
HS118	COSMO.jl unenhanced	optimal	optimal	4.801×10^{-3}	4.055×10^{-3}	6.099×10^{-6}
HS118	SCS unenhanced	optimal	optimal	5.014×10^{-4}	3.748×10^{-4}	5.638×10^{-7}
LOTSCHD	Clarabel	optimal	optimal	0.0182897	7.496×10^{-6}	3.126×10^{-9}
LOTSCHD	SCS	optimal	optimal	4.783×10^{-4}	5.349×10^{-3}	2.230×10^{-6}
LOTSCHD	OSQP	optimal	optimal	0.0184755	0.0306451	1.278×10^{-5}
LOTSCHD	CCosmo	optimal	optimal	2.031×10^{-4}	0.0206506	8.610×10^{-6}
LOTSCHD	CCosmo unenhanced	optimal	optimal	6.849×10^{-4}	0.0476956	1.989×10^{-5}
LOTSCHD	COSMO.jl	optimal	optimal	3.536×10^{-3}	2.013×10^{-5}	8.393×10^{-9}
LOTSCHD	COSMO.jl unenhanced	optimal	optimal	1.537×10^{-3}	0.101898	4.249×10^{-5}
LOTSCHD	SCS unenhanced	optimal	optimal	3.400×10^{-3}	1.015×10^{-4}	4.231×10^{-8}
QAFIRO	Clarabel	optimal	optimal	0.02401	3.450×10^{-9}	2.169×10^{-9}
QAFIRO	SCS	optimal	optimal	3.727×10^{-3}	1.261×10^{-5}	7.926×10^{-6}
QAFIRO	OSQP	optimal	optimal	0.023745	9.061×10^{-6}	5.696×10^{-6}
QAFIRO	CCosmo	optimal	optimal	3.945×10^{-3}	6.357×10^{-5}	3.996×10^{-5}
QAFIRO	CCosmo unenhanced	optimal	optimal	5.329×10^{-3}	3.669×10^{-5}	2.307×10^{-5}
QAFIRO	COSMO.jl	optimal	failed	1.204×10^{-3}	0.0112853	7.094×10^{-3}
QAFIRO	COSMO.jl unenhanced	optimal	failed	5.496×10^{-3}	0.0249086	0.0156581
QAFIRO	SCS unenhanced	optimal	optimal	1.429×10^{-3}	3.123×10^{-6}	1.963×10^{-6}
QSCAGR7	Clarabel	optimal	optimal	0.0368039	0.0147037	5.473×10^{-10}
QSCAGR7	SCS	optimal	optimal	0.241921	102.034	3.798×10^{-6}
QSCAGR7	OSQP	optimal	optimal	0.16933	1653.31	6.154×10^{-5}
QSCAGR7	CCosmo	max_iters	failed	0.136097	1081.92	4.027×10^{-5}
QSCAGR7	CCosmo unenhanced	max_iters	failed	0.132886	1.710×10^{6}	0.0636415
QSCAGR7	COSMO.jl	optimal	optimal	0.158296	1050.7	3.911×10^{-5}
QSCAGR7	COSMO.jl unenhanced	max_iters	failed	0.39254	1.710×10^{6}	0.0636571
QSCAGR7	SCS unenhanced	optimal	optimal	0.285926	309.904	1.154×10^{-5}
QADLITTL	Clarabel	optimal	optimal	0.0356977	4.075×10^{-4}	8.484×10^{-10}
QADLITTL	SCS	optimal	optimal	0.0180611	0.0177414	3.694×10^{-8}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
QADLITTL	OSQP	optimal	optimal	0.0447582	4.63703	9.654×10^{-6}
QADLITTL	CCosmo	optimal	optimal	0.0297358	0.773946	1.611×10^{-6}
QADLITTL	CCosmo unenhanced	max_iters	failed	0.0946648	1146.29	2.387×10^{-3}
QADLITTL	COSMO.jl	optimal	optimal	0.0240719	31.923	6.646×10^{-5}
QADLITTL	COSMO.jl unenhanced	max_iters	failed	0.19803	1146.58	2.387×10^{-3}
QADLITTL	SCS unenhanced	optimal	failed	0.168913	322.201	6.708×10^{-4}
QPCBLEND	Clarabel	optimal	optimal	0.0368428	1.440×10^{-9}	1.836×10^{-7}
QPCBLEND	SCS	optimal	optimal	0.095644	6.098×10^{-6}	7.775×10^{-4}
QPCBLEND	OSQP	optimal	optimal	0.0523515	4.866×10^{-8}	6.205×10^{-6}
QPCBLEND	CCosmo	optimal	optimal	0.0159793	2.793×10^{-7}	3.561×10^{-5}
QPCBLEND	CCosmo unenhanced	max_iters	failed	0.116087	0.0122959	1.56785
QPCBLEND	COSMO.jl	optimal	optimal	0.041683	4.658×10^{-4}	0.0593885
QPCBLEND	COSMO.jl unenhanced	max_iters	failed	0.186482	0.0122964	1.56791
QPCBLEND	SCS unenhanced	optimal	optimal	0.24053	2.578×10^{-3}	0.328741
QSC205	Clarabel	unknown	failed	0.040369	–	–
QSC205	SCS	optimal	optimal	0.144052	1.269×10^{-5}	2.182×10^{-3}
QSC205	OSQP	optimal	optimal	0.0651843	1.805×10^{-5}	3.105×10^{-3}
QSC205	CCosmo	optimal	optimal	0.0389413	3.221×10^{-5}	5.539×10^{-3}
QSC205	CCosmo unenhanced	optimal	optimal	0.094933	2.725×10^{-5}	4.687×10^{-3}
QSC205	COSMO.jl	optimal	optimal	0.137616	5.566×10^{-5}	9.574×10^{-3}
QSC205	COSMO.jl unenhanced	optimal	optimal	0.108947	9.097×10^{-5}	0.015647
QSC205	SCS unenhanced	optimal	optimal	0.0704889	1.014×10^{-5}	1.744×10^{-3}
CVXQP2_S	Clarabel	optimal	optimal	0.0251872	1.323×10^{-6}	1.629×10^{-10}
CVXQP2_S	SCS	optimal	optimal	6.714×10^{-3}	3.441×10^{-3}	4.237×10^{-7}
CVXQP2_S	OSQP	optimal	optimal	0.0200905	5.820×10^{-3}	7.166×10^{-7}
CVXQP2_S	CCosmo	optimal	optimal	4.210×10^{-3}	0.0290332	3.575×10^{-6}
CVXQP2_S	CCosmo unenhanced	max_iters	failed	0.175163	34.3373	4.228×10^{-3}
CVXQP2_S	COSMO.jl	optimal	optimal	6.047×10^{-3}	0.0262974	3.238×10^{-6}
CVXQP2_S	COSMO.jl unenhanced	max_iters	failed	0.278288	34.3442	4.229×10^{-3}
CVXQP2_S	SCS unenhanced	optimal	optimal	0.107714	5.675×10^{-6}	6.989×10^{-10}
QSHARE2B	Clarabel	optimal	optimal	0.0370829	2.529×10^{-5}	2.161×10^{-9}
QSHARE2B	SCS	unknown	failed	0.227611	76.2916	6.519×10^{-3}
QSHARE2B	OSQP	max_iters	failed	0.155361	106.938	9.137×10^{-3}
QSHARE2B	CCosmo	max_iters	failed	0.135783	108.59	9.278×10^{-3}
QSHARE2B	CCosmo unenhanced	max_iters	failed	0.168652	4105.55	0.350791
QSHARE2B	COSMO.jl	optimal	optimal	0.244311	1.30911	1.119×10^{-4}
QSHARE2B	COSMO.jl unenhanced	max_iters	failed	0.216885	4105.58	0.350793
QSHARE2B	SCS unenhanced	optimal	failed	0.203536	1998.09	0.170723
CVXQP1_S	Clarabel	optimal	optimal	0.0365397	2.089×10^{-5}	1.802×10^{-9}
CVXQP1_S	SCS	optimal	optimal	0.0428281	1.286×10^{-3}	1.109×10^{-7}
CVXQP1_S	OSQP	optimal	optimal	0.053509	0.149311	1.288×10^{-5}
CVXQP1_S	CCosmo	optimal	optimal	0.0123447	6.528×10^{-4}	5.632×10^{-8}
CVXQP1_S	CCosmo unenhanced	max_iters	failed	0.201404	457.021	0.0394299
CVXQP1_S	COSMO.jl	optimal	optimal	0.0269721	0.0223875	1.932×10^{-6}
CVXQP1_S	COSMO.jl unenhanced	max_iters	failed	0.356036	457.051	0.0394325
CVXQP1_S	SCS unenhanced	optimal	failed	0.243511	39.6761	3.423×10^{-3}
QRECIPE	Clarabel	optimal	optimal	0.0401829	3.664×10^{-3}	1.374×10^{-5}
QRECIPE	SCS	optimal	optimal	7.079×10^{-3}	1.456×10^{-3}	5.459×10^{-6}
QRECIPE	OSQP	optimal	optimal	0.0413404	5.575×10^{-4}	2.091×10^{-6}
QRECIPE	CCosmo	optimal	optimal	0.0186675	6.745×10^{-4}	2.530×10^{-6}
QRECIPE	CCosmo unenhanced	optimal	optimal	0.0139609	6.745×10^{-4}	2.530×10^{-6}
QRECIPE	COSMO.jl	optimal	optimal	0.125792	4.677×10^{-10}	1.754×10^{-12}
QRECIPE	COSMO.jl unenhanced	optimal	optimal	0.0681238	3.993×10^{-4}	1.498×10^{-6}
QRECIPE	SCS unenhanced	optimal	optimal	0.03561	5.286×10^{-4}	1.982×10^{-6}
CVXQP3_S	Clarabel	optimal	optimal	0.0243456	3.428×10^{-6}	2.871×10^{-10}
CVXQP3_S	SCS	optimal	optimal	0.071199	0.0773555	6.477×10^{-6}
CVXQP3_S	OSQP	optimal	optimal	0.0660267	0.0944156	7.905×10^{-6}
CVXQP3_S	CCosmo	optimal	optimal	0.0239841	0.0604052	5.058×10^{-6}
CVXQP3_S	CCosmo unenhanced	max_iters	failed	0.216913	142.372	0.0119205
CVXQP3_S	COSMO.jl	optimal	optimal	0.0789039	0.0813688	6.813×10^{-6}
CVXQP3_S	COSMO.jl unenhanced	max_iters	failed	0.289334	142.391	0.0119221
CVXQP3_S	SCS unenhanced	optimal	failed	0.230467	7.74708	6.486×10^{-4}
QSHARE1B	Clarabel	optimal	optimal	0.0396501	119.775	1.663×10^{-4}
QSHARE1B	SCS	unknown	failed	0.374478	7675.31	0.010659
QSHARE1B	OSQP	max_iters	failed	0.288891	8.029×10^{5}	1.11497
QSHARE1B	CCosmo	max_iters	failed	0.235519	10947.3	0.015203
QSHARE1B	CCosmo unenhanced	max_iters	failed	0.25977	13793.6	0.0191557
QSHARE1B	COSMO.jl	max_iters	failed	0.550178	7.388×10^{5}	1.02602
QSHARE1B	COSMO.jl unenhanced	max_iters	failed	0.420201	13793.4	0.0191554
QSHARE1B	SCS unenhanced	optimal	failed	0.367258	12793.3	0.0177665
QPCBOEI2	Clarabel	optimal	optimal	0.0355254	0.0129807	1.588×10^{-9}
QPCBOEI2	SCS	unknown	failed	0.305361	9.756×10^{5}	0.119378
QPCBOEI2	OSQP	max_iters	failed	0.235969	9.796×10^{5}	0.119871
QPCBOEI2	CCosmo	max_iters	failed	0.213958	9.742×10^{5}	0.119209
QPCBOEI2	CCosmo unenhanced	max_iters	failed	0.234474	1.034×10^{6}	0.126486
QPCBOEI2	COSMO.jl	max_iters	failed	0.479784	7.862×10^{5}	0.0962025

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
QPCBOEI2	COSMO.jl unenhanced	max_iters	failed	0.366834	1.034×10^{6}	0.126486
QPCBOEI2	SCS unenhanced	optimal	failed	0.309317	1.030×10^{6}	0.126
DUALC2	Clarabel	optimal	optimal	0.0273184	3.041×10^{-6}	8.563×10^{-10}
DUALC2	SCS	optimal	optimal	6.252×10^{-3}	8.548×10^{-3}	2.407×10^{-6}
DUALC2	OSQP	max_iters	failed	0.109578	2.519×10^{6}	709.39
DUALC2	CCosmo	max_iters	failed	0.0901881	789.132	0.222209
DUALC2	CCosmo unenhanced	max_iters	failed	0.0879596	7.869×10^{5}	221.593
DUALC2	COSMO.jl	optimal	optimal	5.821×10^{-3}	3.240×10^{-6}	9.122×10^{-10}
DUALC2	COSMO.jl unenhanced	max_iters	failed	0.163152	7.884×10^{5}	222.013
DUALC2	SCS unenhanced	optimal	failed	0.1492	2.139×10^{6}	602.328
DPKLO1	Clarabel	optimal	optimal	0.0283339	1.552×10^{-10}	4.195×10^{-10}
DPKLO1	SCS	optimal	optimal	0.0113417	3.837×10^{-7}	1.037×10^{-6}
DPKLO1	OSQP	optimal	optimal	0.025935	7.855×10^{-6}	2.123×10^{-5}
DPKLO1	CCosmo	optimal	optimal	4.741×10^{-3}	2.899×10^{-6}	7.834×10^{-6}
DPKLO1	CCosmo unenhanced	optimal	optimal	1.033×10^{-3}	1.735×10^{-6}	4.688×10^{-6}
DPKLO1	COSMO.jl	optimal	optimal	5.640×10^{-3}	1.623×10^{-6}	4.385×10^{-6}
DPKLO1	COSMO.jl unenhanced	optimal	optimal	1.319×10^{-3}	1.570×10^{-4}	4.242×10^{-4}
DPKLO1	SCS unenhanced	optimal	optimal	4.385×10^{-3}	4.852×10^{-7}	1.311×10^{-6}
QSCORPIO	Clarabel	optimal	optimal	0.037288	1.184×10^{-6}	6.294×10^{-10}
QSCORPIO	SCS	unknown	failed	0.649571	0.209752	1.115×10^{-4}
QSCORPIO	OSQP	max_iters	failed	0.42755	0.236711	1.259×10^{-4}
QSCORPIO	CCosmo	max_iters	failed	0.406317	0.322412	1.714×10^{-4}
QSCORPIO	CCosmo unenhanced	max_iters	failed	0.397186	1477.05	0.785449
QSCORPIO	COSMO.jl	max_iters	failed	0.957975	0.218897	1.164×10^{-4}
QSCORPIO	COSMO.jl unenhanced	max_iters	failed	0.697382	1477.05	0.785449
QSCORPIO	SCS unenhanced	optimal	failed	0.636064	161.145	0.0856924
QBORE3D	Clarabel	optimal	optimal	0.0500292	9.139×10^{-4}	2.948×10^{-7}
QBORE3D	SCS	unknown	failed	0.577419	101.199	0.0326427
QBORE3D	OSQP	max_iters	failed	0.473814	8.627×10^{6}	2782.84
QBORE3D	CCosmo	max_iters	failed	0.582971	5.87459	1.895×10^{-3}
QBORE3D	CCosmo unenhanced	max_iters	failed	0.420297	40.6496	0.0131119
QBORE3D	COSMO.jl	max_iters	failed	0.903973	3550.74	1.14533
QBORE3D	COSMO.jl unenhanced	max_iters	failed	0.672395	40.6877	0.0131242
QBORE3D	SCS unenhanced	optimal	failed	0.551655	297.552	0.0959783
DUALC1	Clarabel	optimal	optimal	0.0234687	9.193×10^{-6}	1.493×10^{-9}
DUALC1	SCS	optimal	optimal	4.941×10^{-3}	0.25036	4.067×10^{-5}
DUALC1	OSQP	max_iters	failed	0.126578	1.713×10^{5}	27.8312
DUALC1	CCosmo	max_iters	failed	0.0849239	57641	9.36452
DUALC1	CCosmo unenhanced	max_iters	failed	0.0839256	3.610×10^{6}	586.554
DUALC1	COSMO.jl	optimal	optimal	5.864×10^{-3}	1.92455	3.127×10^{-4}
DUALC1	COSMO.jl unenhanced	max_iters	failed	0.150867	3.610×10^{6}	586.554
DUALC1	SCS unenhanced	optimal	failed	0.132675	3.586×10^{6}	582.615
PRIMALC2	Clarabel	optimal	optimal	0.0232994	3.960×10^{-6}	1.115×10^{-9}
PRIMALC2	SCS	optimal	optimal	0.0289838	0.0144647	4.073×10^{-6}
PRIMALC2	OSQP	max_iters	failed	0.158105	1.453×10^{8}	40911.2
PRIMALC2	CCosmo	max_iters	failed	0.155189	5430.66	1.5292
PRIMALC2	CCosmo unenhanced	max_iters	failed	0.156835	58515.2	16.4771
PRIMALC2	COSMO.jl	optimal	failed	0.0533118	200.29	0.0563988
PRIMALC2	COSMO.jl unenhanced	max_iters	failed	0.26327	58513.1	16.4765
PRIMALC2	SCS unenhanced	optimal	failed	0.207117	19537.5	5.50151
QSCAGR25	Clarabel	optimal	optimal	0.0457938	0.553555	2.744×10^{-9}
QSCAGR25	SCS	optimal	optimal	0.244757	506.978	2.513×10^{-6}
QSCAGR25	OSQP	optimal	optimal	0.257121	7083.4	3.511×10^{-5}
QSCAGR25	CCosmo	optimal	optimal	0.316175	2043.2	1.013×10^{-5}
QSCAGR25	CCosmo unenhanced	max_iters	failed	0.455408	3.619×10^{6}	0.0179396
QSCAGR25	COSMO.jl	max_iters	failed	1.12703	10336.9	5.124×10^{-5}
QSCAGR25	COSMO.jl unenhanced	max_iters	failed	0.775565	3.620×10^{6}	0.0179421
QSCAGR25	SCS unenhanced	optimal	optimal	0.751486	8898.98	4.411×10^{-5}
DUALC5	Clarabel	optimal	optimal	0.0236698	1.896×10^{-8}	4.438×10^{-11}
DUALC5	SCS	optimal	optimal	0.0177283	1.038×10^{-4}	2.429×10^{-7}
DUALC5	OSQP	max_iters	failed	0.148649	10302.9	24.1155
DUALC5	CCosmo	max_iters	failed	0.102503	108.544	0.254063
DUALC5	CCosmo unenhanced	max_iters	failed	0.101345	311.285	0.728608
DUALC5	COSMO.jl	optimal	optimal	4.906×10^{-3}	2.239×10^{-7}	5.241×10^{-10}
DUALC5	COSMO.jl unenhanced	max_iters	failed	0.20432	311.321	0.728693
DUALC5	SCS unenhanced	optimal	failed	0.149121	143.834	0.336666
QSCTAP1	Clarabel	optimal	optimal	0.0365287	9.529×10^{-7}	6.730×10^{-10}
QSCTAP1	SCS	optimal	optimal	0.413923	8.315×10^{-4}	5.873×10^{-7}
QSCTAP1	OSQP	max_iters	failed	0.382142	2.08509	1.473×10^{-3}
QSCTAP1	CCosmo	max_iters	failed	0.3554	198.258	0.140026
QSCTAP1	CCosmo unenhanced	max_iters	failed	0.362345	87.2679	0.0616359
QSCTAP1	COSMO.jl	optimal	failed	0.49033	0.767421	5.420×10^{-4}
QSCTAP1	COSMO.jl unenhanced	max_iters	failed	0.611329	87.2444	0.0616193
QSCTAP1	SCS unenhanced	optimal	failed	0.680234	1.85489	1.310×10^{-3}
QBRANDY	Clarabel	optimal	optimal	0.0660239	3.582×10^{-5}	1.263×10^{-9}
QBRANDY	SCS	unknown	failed	0.906673	13.1692	4.641×10^{-4}
QBRANDY	OSQP	max_iters	failed	0.747333	610.287	0.0215078

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
QBRANDY	CCosmo	max_iters	failed	0.731297	204.838	7.219×10^{-3}
QBRANDY	CCosmo unenhanced	max_iters	failed	0.713288	649.135	0.0228769
QBRANDY	COSMO.jl	max_iters	failed	1.12431	212.021	7.472×10^{-3}
QBRANDY	COSMO.jl unenhanced	max_iters	failed	0.91341	649.015	0.0228727
QBRANDY	SCS unenhanced	optimal	failed	0.875836	90.7798	3.199×10^{-3}
PRIMALC1	Clarabel	optimal	optimal	0.0370533	8.865×10^{-6}	1.440×10^{-9}
PRIMALC1	SCS	optimal	failed	0.232935	4.1813	6.793×10^{-4}
PRIMALC1	OSQP	max_iters	failed	0.251458	1.362×10^{8}	22126.5
PRIMALC1	CCosmo	max_iters	failed	0.216858	37338.9	6.06618
PRIMALC1	CCosmo unenhanced	max_iters	failed	0.214046	2.417×10^{6}	392.594
PRIMALC1	COSMO.jl	optimal	failed	0.245214	37.7141	6.127×10^{-3}
PRIMALC1	COSMO.jl unenhanced	max_iters	failed	0.323183	2.417×10^{6}	392.608
PRIMALC1	SCS unenhanced	optimal	failed	0.288989	2.230×10^{6}	362.286
GOULDQP2	Clarabel	optimal	optimal	0.0515899	3.757×10^{-10}	2.039×10^{-6}
GOULDQP2	SCS	optimal	optimal	0.490189	2.552×10^{-8}	1.385×10^{-4}
GOULDQP2	OSQP	optimal	optimal	0.180187	6.969×10^{-8}	3.782×10^{-4}
GOULDQP2	CCosmo	optimal	optimal	0.660903	4.483×10^{-7}	2.433×10^{-3}
GOULDQP2	CCosmo unenhanced	optimal	optimal	0.6429	4.481×10^{-7}	2.432×10^{-3}
GOULDQP2	COSMO.jl	optimal	optimal	0.265425	7.492×10^{-8}	4.066×10^{-4}
GOULDQP2	COSMO.jl unenhanced	optimal	optimal	0.0560131	1.304×10^{-5}	0.0707587
GOULDQP2	SCS unenhanced	optimal	optimal	1.22885	4.491×10^{-7}	2.437×10^{-3}
PRIMALC5	Clarabel	optimal	optimal	0.0309705	7.067×10^{-7}	1.654×10^{-9}
PRIMALC5	SCS	optimal	optimal	0.0177177	9.493×10^{-3}	2.222×10^{-5}
PRIMALC5	OSQP	max_iters	failed	0.264221	1.439×10^{7}	33681
PRIMALC5	CCosmo	max_iters	failed	0.257741	461.236	1.07959
PRIMALC5	CCosmo unenhanced	max_iters	failed	0.245641	3824.24	8.95119
PRIMALC5	COSMO.jl	optimal	optimal	0.0418348	0.11399	2.668×10^{-4}
PRIMALC5	COSMO.jl unenhanced	max_iters	failed	0.426656	3834.07	8.97419
PRIMALC5	SCS unenhanced	optimal	optimal	0.294427	4.360×10^{-5}	1.020×10^{-7}
QBANDM	Clarabel	optimal	optimal	0.0724066	5.417×10^{-4}	3.313×10^{-8}
QBANDM	SCS	optimal	optimal	0.602013	0.432911	2.647×10^{-5}
QBANDM	OSQP	optimal	optimal	0.305479	0.547216	3.346×10^{-5}
QBANDM	CCosmo	optimal	optimal	0.360509	0.792905	4.849×10^{-5}
QBANDM	CCosmo unenhanced	optimal	optimal	0.365037	0.607461	3.715×10^{-5}
QBANDM	COSMO.jl	max_iters	failed	1.56138	0.0628214	3.842×10^{-6}
QBANDM	COSMO.jl unenhanced	optimal	optimal	0.42386	0.718459	4.394×10^{-5}
QBANDM	SCS unenhanced	optimal	optimal	0.543935	0.398343	2.436×10^{-5}
QGROW7	Clarabel	optimal	optimal	0.0850143	0.054559	1.275×10^{-9}
QGROW7	SCS	unknown	failed	1.22835	2.156×10^{5}	5.037×10^{-3}
QGROW7	OSQP	max_iters	failed	1.02826	2.720×10^{5}	6.356×10^{-3}
QGROW7	CCosmo	max_iters	failed	1.07885	8.949×10^{6}	0.209094
QGROW7	CCosmo unenhanced	max_iters	failed	1.03178	8.949×10^{6}	0.209103
QGROW7	COSMO.jl	max_iters	failed	1.4948	5.523×10^{6}	0.129036
QGROW7	COSMO.jl unenhanced	max_iters	failed	1.25278	8.950×10^{6}	0.209116
QGROW7	SCS unenhanced	optimal	failed	1.20059	8.757×10^{6}	0.204618
QBEACONF	Clarabel	optimal	optimal	0.077569	1.73175	1.051×10^{-5}
QBEACONF	SCS	optimal	optimal	0.341985	1.2932	7.851×10^{-6}
QBEACONF	OSQP	optimal	optimal	0.149132	1.09457	6.645×10^{-6}
QBEACONF	CCosmo	optimal	optimal	0.287573	1.48059	8.989×10^{-6}
QBEACONF	CCosmo unenhanced	optimal	optimal	0.188487	0.705217	4.282×10^{-6}
QBEACONF	COSMO.jl	optimal	optimal	0.282605	0.728911	4.425×10^{-6}
QBEACONF	COSMO.jl unenhanced	optimal	optimal	0.222866	0.654381	3.973×10^{-6}
QBEACONF	SCS unenhanced	optimal	optimal	0.257167	0.364126	2.211×10^{-6}
QGFRDXPN	Clarabel	optimal	optimal	0.0771792	466.224	4.626×10^{-9}
QGFRDXPN	SCS	unknown	failed	1.72972	7.884×10^{7}	7.823×10^{-4}
QGFRDXPN	OSQP	max_iters	failed	1.04161	5.804×10^{8}	5.759×10^{-3}
QGFRDXPN	CCosmo	max_iters	failed	1.0983	3.337×10^{8}	3.311×10^{-3}
QGFRDXPN	CCosmo unenhanced	max_iters	failed	1.05765	5.828×10^{8}	5.782×10^{-3}
QGFRDXPN	COSMO.jl	max_iters	failed	2.68055	1.050×10^{8}	1.042×10^{-3}
QGFRDXPN	COSMO.jl unenhanced	max_iters	failed	1.70046	5.828×10^{8}	5.782×10^{-3}
QGFRDXPN	SCS unenhanced	optimal	failed	1.70255	6.213×10^{8}	6.164×10^{-3}
QISRAEL	Clarabel	optimal	optimal	0.0466941	0.0658956	2.600×10^{-9}
QISRAEL	SCS	optimal	optimal	0.0637633	31.1496	1.229×10^{-6}
QISRAEL	OSQP	max_iters	failed	0.294481	6821.67	2.691×10^{-4}
QISRAEL	CCosmo	max_iters	failed	0.265682	2115.82	8.347×10^{-5}
QISRAEL	CCosmo unenhanced	max_iters	failed	0.281286	35980.4	1.419×10^{-3}
QISRAEL	COSMO.jl	max_iters	failed	0.522487	48772.8	1.924×10^{-3}
QISRAEL	COSMO.jl unenhanced	max_iters	failed	0.413537	35922.8	1.417×10^{-3}
QISRAEL	SCS unenhanced	optimal	failed	0.342635	39975.9	1.577×10^{-3}
GOULDQP3	Clarabel	optimal	optimal	0.0406562	2.337×10^{-5}	1.133×10^{-5}
GOULDQP3	SCS	optimal	optimal	0.0354208	1.569×10^{-6}	7.605×10^{-7}
GOULDQP3	OSQP	optimal	optimal	0.0528618	3.179×10^{-7}	1.541×10^{-7}
GOULDQP3	CCosmo	optimal	optimal	0.0122766	2.443×10^{-8}	1.184×10^{-8}
GOULDQP3	CCosmo unenhanced	optimal	optimal	0.0715377	6.814×10^{-5}	3.303×10^{-5}
GOULDQP3	COSMO.jl	optimal	optimal	0.107672	9.074×10^{-7}	4.399×10^{-7}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
GOULDQP3	COSMO.jl unenhanced	optimal	optimal	0.132365	7.048×10^{-5}	3.417×10^{-5}
GOULDQP3	SCS unenhanced	optimal	optimal	0.136333	8.816×10^{-6}	4.274×10^{-6}
QCAPRI	Clarabel	optimal	optimal	0.103299	3.0716	4.599×10^{-8}
QCAPRI	SCS	unknown	failed	0.834846	1.395×10^{7}	0.20885
QCAPRI	OSQP	max_iters	failed	0.629992	2.832×10^{7}	0.423929
QCAPRI	CCosmo	max_iters	failed	0.61236	2.355×10^{7}	0.352637
QCAPRI	CCosmo unenhanced	max_iters	failed	0.598417	3.311×10^{7}	0.495703
QCAPRI	COSMO.jl	max_iters	failed	1.1253	2.026×10^{7}	0.303382
QCAPRI	COSMO.jl unenhanced	max_iters	failed	0.884441	3.311×10^{7}	0.495706
QCAPRI	SCS unenhanced	optimal	failed	0.837795	3.130×10^{7}	0.468669
DUALC8	Clarabel	optimal	optimal	0.0330896	3.510×10^{-5}	1.917×10^{-9}
DUALC8	SCS	optimal	optimal	0.0163314	5.041×10^{-5}	2.753×10^{-9}
DUALC8	OSQP	max_iters	failed	0.235418	1649.08	0.0900675
DUALC8	CCosmo	max_iters	failed	0.210576	1.066×10^{5}	5.81965
DUALC8	CCosmo unenhanced	max_iters	failed	0.201845	18490.5	1.0099
DUALC8	COSMO.jl	optimal	optimal	0.011152	3.273×10^{-5}	1.788×10^{-9}
DUALC8	COSMO.jl unenhanced	max_iters	failed	0.37602	18490.5	1.0099
DUALC8	SCS unenhanced	optimal	failed	0.301143	4724.4	0.258032
QPCBOEI1	Clarabel	optimal	optimal	0.0634794	0.0308648	2.683×10^{-9}
QPCBOEI1	SCS	unknown	failed	1.06041	6993.09	6.079×10^{-4}
QPCBOEI1	OSQP	max_iters	failed	0.842837	70362.4	6.116×10^{-3}
QPCBOEI1	CCosmo	max_iters	failed	0.754897	46531.8	4.045×10^{-3}
QPCBOEI1	CCosmo unenhanced	max_iters	failed	0.762294	6.019×10^{5}	0.052319
QPCBOEI1	COSMO.jl	optimal	optimal	0.438625	606.902	5.276×10^{-5}
QPCBOEI1	COSMO.jl unenhanced	max_iters	failed	1.09039	6.019×10^{5}	0.052319
QPCBOEI1	SCS unenhanced	optimal	failed	1.04098	4.794×10^{5}	0.0416755
QSCFXM1	Clarabel	optimal	optimal	0.108951	0.0467268	2.768×10^{-9}
QSCFXM1	SCS	unknown	failed	1.03824	2.710×10^{6}	0.16052
QSCFXM1	OSQP	max_iters	failed	0.779211	9.924×10^{6}	0.587841
QSCFXM1	CCosmo	max_iters	failed	0.755028	2.508×10^{6}	0.148554
QSCFXM1	CCosmo unenhanced	max_iters	failed	0.767892	1.246×10^{7}	0.737914
QSCFXM1	COSMO.jl	max_iters	failed	1.36905	2.332×10^{6}	0.138138
QSCFXM1	COSMO.jl unenhanced	max_iters	failed	2.0593	1.246×10^{7}	0.73793
QSCFXM1	SCS unenhanced	optimal	failed	0.98143	3.298×10^{6}	0.195329
QSCRS8	Clarabel	optimal	optimal	0.120245	4.081×10^{-6}	4.511×10^{-9}
QSCRS8	SCS	unknown	failed	1.72814	41.6842	0.0460823
QSCRS8	OSQP	max_iters	failed	1.05192	1.24267	1.374×10^{-3}
QSCRS8	CCosmo	max_iters	failed	1.14165	298.423	0.32991
QSCRS8	CCosmo unenhanced	max_iters	failed	1.02179	392.191	0.433571
QSCRS8	COSMO.jl	max_iters	failed	2.60402	53.0651	0.058664
QSCRS8	COSMO.jl unenhanced	max_iters	failed	1.72354	392.132	0.433506
QSCRS8	SCS unenhanced	optimal	failed	1.71149	199.597	0.220656
QSCSD1	Clarabel	optimal	optimal	0.0773102	7.579×10^{-9}	8.745×10^{-10}
QSCSD1	SCS	optimal	optimal	0.0525957	3.849×10^{-5}	4.441×10^{-6}
QSCSD1	OSQP	max_iters	failed	0.912393	8.587×10^{-3}	9.908×10^{-4}
QSCSD1	CCosmo	optimal	optimal	0.187883	4.305×10^{-5}	4.968×10^{-6}
QSCSD1	CCosmo unenhanced	optimal	optimal	0.817679	4.705×10^{-7}	5.429×10^{-8}
QSCSD1	COSMO.jl	optimal	optimal	0.090781	1.477×10^{-5}	1.704×10^{-6}
QSCSD1	COSMO.jl unenhanced	optimal	optimal	1.03251	5.174×10^{-4}	5.970×10^{-5}
QSCSD1	SCS unenhanced	optimal	optimal	0.962258	1.774×10^{-7}	2.047×10^{-8}
QE226	Clarabel	optimal	optimal	0.0653731	1.419×10^{-6}	6.673×10^{-9}
QE226	SCS	unknown	failed	0.744275	0.167678	7.885×10^{-4}
QE226	OSQP	max_iters	failed	0.713188	0.0522464	2.457×10^{-4}
QE226	CCosmo	max_iters	failed	0.590252	0.25896	1.218×10^{-3}
QE226	CCosmo unenhanced	max_iters	failed	0.594235	0.488524	2.297×10^{-3}
QE226	COSMO.jl	max_iters	failed	1.06115	1.401×10^{-3}	6.586×10^{-6}
QE226	COSMO.jl unenhanced	max_iters	failed	0.809402	0.488631	2.298×10^{-3}
QE226	SCS unenhanced	optimal	optimal	0.810716	0.0871272	4.097×10^{-4}
QPCSTAIR	Clarabel	optimal	optimal	0.0856247	7.154×10^{-4}	1.153×10^{-10}
QPCSTAIR	SCS	optimal	optimal	0.456599	1.10934	1.788×10^{-7}
QPCSTAIR	OSQP	optimal	optimal	0.83876	116.301	1.875×10^{-5}
QPCSTAIR	CCosmo	optimal	optimal	0.32775	16.9559	2.733×10^{-6}
QPCSTAIR	CCosmo unenhanced	max_iters	failed	0.972848	3.561×10^{6}	0.573973
QPCSTAIR	COSMO.jl	optimal	optimal	0.41476	559.192	9.013×10^{-5}
QPCSTAIR	COSMO.jl unenhanced	max_iters	failed	1.30881	3.561×10^{6}	0.573991
QPCSTAIR	SCS unenhanced	optimal	failed	1.31486	1.132×10^{6}	0.182509
MOSARQP2	Clarabel	optimal	optimal	0.0538184	7.169×10^{-6}	4.488×10^{-9}
MOSARQP2	SCS	optimal	optimal	0.0544142	7.495×10^{-6}	4.692×10^{-9}
MOSARQP2	OSQP	optimal	optimal	0.0484898	7.523×10^{-6}	4.710×10^{-9}
MOSARQP2	CCosmo	optimal	optimal	0.0302949	6.846×10^{-5}	4.285×10^{-8}
MOSARQP2	CCosmo unenhanced	optimal	optimal	0.21646	1.207×10^{-4}	7.557×10^{-8}
MOSARQP2	COSMO.jl	optimal	optimal	0.089921	2.036×10^{-5}	1.274×10^{-8}
MOSARQP2	COSMO.jl unenhanced	optimal	optimal	0.305964	1.018×10^{-4}	6.372×10^{-8}
MOSARQP2	SCS unenhanced	optimal	optimal	0.179697	7.558×10^{-6}	4.731×10^{-9}
PRIMALC8	Clarabel	optimal	optimal	0.0450122	1.530×10^{-4}	8.357×10^{-9}
PRIMALC8	SCS	optimal	optimal	0.0317227	2.198×10^{-3}	1.200×10^{-7}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
PRIMALC8	OSQP	max_iters	failed	0.453013	2.546×10^{8}	13907.2
PRIMALC8	CCosmo	max_iters	failed	0.480401	6860.61	0.374704
PRIMALC8	CCosmo unenhanced	max_iters	failed	0.424705	1.346×10^{5}	7.35039
PRIMALC8	COSMO.jl	max_iters	failed	0.923424	38627.4	2.1097
PRIMALC8	COSMO.jl unenhanced	max_iters	failed	0.74601	1.346×10^{5}	7.34999
PRIMALC8	SCS unenhanced	optimal	failed	0.719577	1.808×10^{5}	9.87641
QSTANDAT	Clarabel	optimal	optimal	0.0680387	6.155×10^{-7}	9.600×10^{-11}
QSTANDAT	SCS	optimal	optimal	0.58596	0.273131	4.260×10^{-5}
QSTANDAT	OSQP	max_iters	failed	1.03311	1045.32	0.16303
QSTANDAT	CCosmo	max_iters	failed	0.948745	506.983	0.0790698
QSTANDAT	CCosmo unenhanced	max_iters	failed	0.9545	4451.17	0.694211
QSTANDAT	COSMO.jl	optimal	failed	1.21616	3.40109	5.304×10^{-4}
QSTANDAT	COSMO.jl unenhanced	max_iters	failed	1.45173	4451.52	0.694266
QSTANDAT	SCS unenhanced	optimal	failed	1.47815	52.4878	8.186×10^{-3}
DUAL4	Clarabel	optimal	optimal	0.0292345	1.062×10^{-10}	1.423×10^{-10}
DUAL4	SCS	optimal	optimal	4.221×10^{-3}	1.177×10^{-6}	1.577×10^{-6}
DUAL4	OSQP	optimal	optimal	0.0247726	4.985×10^{-6}	6.682×10^{-6}
DUAL4	CCosmo	optimal	optimal	1.302×10^{-3}	4.350×10^{-7}	5.830×10^{-7}
DUAL4	CCosmo unenhanced	optimal	optimal	0.0778383	1.810×10^{-5}	2.426×10^{-5}
DUAL4	COSMO.jl	optimal	optimal	1.860×10^{-3}	1.984×10^{-10}	2.659×10^{-10}
DUAL4	COSMO.jl unenhanced	optimal	optimal	0.0934539	2.464×10^{-5}	3.303×10^{-5}
DUAL4	SCS unenhanced	optimal	optimal	0.0600277	7.117×10^{-7}	9.539×10^{-7}
QSHIP04S	Clarabel	optimal	optimal	0.077705	4.517×10^{-3}	1.863×10^{-9}
QSHIP04S	SCS	unknown	failed	1.81892	335.51	1.384×10^{-4}
QSHIP04S	OSQP	optimal	optimal	0.293707	19.8051	8.167×10^{-6}
QSHIP04S	CCosmo	optimal	optimal	0.378177	5.27872	2.177×10^{-6}
QSHIP04S	CCosmo unenhanced	max_iters	failed	1.09345	1.772×10^{6}	0.730813
QSHIP04S	COSMO.jl	optimal	optimal	1.05464	202.808	8.363×10^{-5}
QSHIP04S	COSMO.jl unenhanced	max_iters	failed	1.77623	1.772×10^{6}	0.730899
QSHIP04S	SCS unenhanced	optimal	failed	1.77454	5.685×10^{5}	0.234453
QFORPLAN	Clarabel	optimal	optimal	0.0951361	9.68371	1.299×10^{-9}
QFORPLAN	SCS	unknown	failed	1.20546	7.116×10^{8}	0.0954307
QFORPLAN	OSQP	max_iters	failed	0.907421	4.392×10^{8}	0.0588996
QFORPLAN	CCosmo	optimal	optimal	0.588057	1.322×10^{5}	1.772×10^{-5}
QFORPLAN	CCosmo unenhanced	max_iters	failed	0.860092	2.032×10^{9}	0.272552
QFORPLAN	COSMO.jl	optimal	failed	0.108699	7.569×10^{8}	0.101502
QFORPLAN	COSMO.jl unenhanced	max_iters	failed	1.17771	2.032×10^{9}	0.27257
QFORPLAN	SCS unenhanced	optimal	failed	1.09723	8.234×10^{8}	0.11043
QSTAIR	Clarabel	optimal	optimal	0.123998	0.0574093	7.189×10^{-9}
QSTAIR	SCS	unknown	failed	1.27799	141.925	1.777×10^{-5}
QSTAIR	OSQP	optimal	optimal	0.972397	290.66	3.640×10^{-5}
QSTAIR	CCosmo	max_iters	failed	0.978349	12.9098	1.617×10^{-6}
QSTAIR	CCosmo unenhanced	max_iters	failed	0.989911	2.471×10^{6}	0.309454
QSTAIR	COSMO.jl	max_iters	failed	1.63323	1.359×10^{5}	0.017013
QSTAIR	COSMO.jl unenhanced	max_iters	failed	1.3225	2.471×10^{6}	0.309473
QSTAIR	SCS unenhanced	prim_infeas	failed	1.22526	–	–
PRIMAL1	Clarabel	optimal	optimal	0.0427726	5.543×10^{-10}	1.583×10^{-8}
PRIMAL1	SCS	optimal	optimal	0.0117473	1.765×10^{-7}	5.041×10^{-6}
PRIMAL1	OSQP	optimal	optimal	0.0355939	1.133×10^{-9}	3.237×10^{-8}
PRIMAL1	CCosmo	optimal	optimal	1.690×10^{-3}	6.591×10^{-8}	1.883×10^{-6}
PRIMAL1	CCosmo unenhanced	optimal	optimal	4.665×10^{-3}	6.591×10^{-8}	1.883×10^{-6}
PRIMAL1	COSMO.jl	optimal	optimal	0.0109901	1.139×10^{-9}	3.254×10^{-8}
PRIMAL1	COSMO.jl unenhanced	optimal	optimal	6.195×10^{-3}	5.064×10^{-8}	1.446×10^{-6}
PRIMAL1	SCS unenhanced	optimal	optimal	5.964×10^{-3}	1.114×10^{-7}	3.182×10^{-6}
QSEBA	Clarabel	optimal	optimal	0.114995	0.126748	1.556×10^{-9}
QSEBA	SCS	unknown	failed	1.67371	3.022×10^{5}	3.709×10^{-3}
QSEBA	OSQP	max_iters	failed	1.04193	5.845×10^{7}	0.717326
QSEBA	CCosmo	max_iters	failed	0.995602	2.848×10^{6}	0.0349513
QSEBA	CCosmo unenhanced	max_iters	failed	0.954196	8.136×10^{7}	0.998489
QSEBA	COSMO.jl	max_iters	failed	2.58046	1.596×10^{6}	0.0195822
QSEBA	COSMO.jl unenhanced	max_iters	failed	1.6554	8.136×10^{7}	0.998489
QSEBA	SCS unenhanced	optimal	failed	1.60884	4.316×10^{7}	0.52967
DUAL1	Clarabel	optimal	optimal	0.0462875	1.450×10^{-9}	4.141×10^{-8}
DUAL1	SCS	optimal	optimal	4.847×10^{-3}	1.298×10^{-8}	3.709×10^{-7}
DUAL1	OSQP	optimal	optimal	0.0423659	1.236×10^{-6}	3.531×10^{-5}
DUAL1	CCosmo	optimal	optimal	4.182×10^{-3}	1.183×10^{-6}	3.379×10^{-5}
DUAL1	CCosmo unenhanced	optimal	optimal	0.0173808	2.650×10^{-6}	7.570×10^{-5}
DUAL1	COSMO.jl	optimal	optimal	5.155×10^{-3}	1.924×10^{-8}	5.496×10^{-7}
DUAL1	COSMO.jl unenhanced	optimal	optimal	0.0189621	2.676×10^{-6}	7.642×10^{-5}
DUAL1	SCS unenhanced	optimal	optimal	0.0169184	1.014×10^{-7}	2.896×10^{-6}
QGROW15	Clarabel	optimal	optimal	0.155937	0.457881	4.503×10^{-9}
QGROW15	SCS	unknown	failed	2.63821	3.099×10^{5}	3.048×10^{-3}
QGROW15	OSQP	max_iters	failed	2.17	1.680×10^{5}	1.652×10^{-3}
QGROW15	CCosmo	max_iters	failed	2.1907	2.058×10^{7}	0.202366
QGROW15	CCosmo unenhanced	max_iters	failed	2.15031	2.058×10^{7}	0.202361
QGROW15	COSMO.jl	max_iters	failed	3.32461	7.440×10^{6}	0.0731637

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
QGROW15	COSMO.jl unenhanced	max_iters	failed	2.63471	2.058×10^{7}	0.202373
QGROW15	SCS unenhanced	optimal	failed	2.50229	2.002×10^{7}	0.196897
VALUES	Clarabel	optimal	optimal	0.0399314	4.444×10^{-9}	3.182×10^{-9}
VALUES	SCS	optimal	optimal	0.022181	3.182×10^{-5}	2.279×10^{-5}
VALUES	OSQP	optimal	optimal	0.0712312	4.714×10^{-9}	3.375×10^{-9}
VALUES	CCosmo	optimal	optimal	0.0123122	3.576×10^{-5}	2.561×10^{-5}
VALUES	CCosmo unenhanced	optimal	optimal	0.0123006	3.576×10^{-5}	2.561×10^{-5}
VALUES	COSMO.jl	optimal	optimal	0.0141881	3.349×10^{-5}	2.398×10^{-5}
VALUES	COSMO.jl unenhanced	optimal	optimal	0.031719	3.442×10^{-5}	2.464×10^{-5}
VALUES	SCS unenhanced	optimal	optimal	0.0183279	3.222×10^{-5}	2.307×10^{-5}
QSCFXM2	Clarabel	optimal	optimal	0.217317	0.0772365	2.781×10^{-9}
QSCFXM2	SCS	unknown	failed	2.14751	4.967×10^{6}	0.178839
QSCFXM2	OSQP	max_iters	failed	1.83374	2.567×10^{7}	0.92413
QSCFXM2	CCosmo	max_iters	failed	1.40936	7.376×10^{6}	0.265556
QSCFXM2	CCosmo unenhanced	max_iters	failed	1.42205	2.383×10^{7}	0.857878
QSCFXM2	COSMO.jl	max_iters	failed	2.82204	7.231×10^{6}	0.260315
QSCFXM2	COSMO.jl unenhanced	max_iters	failed	2.2083	2.383×10^{7}	0.857889
QSCFXM2	SCS unenhanced	optimal	failed	2.08302	5.400×10^{6}	0.194421
QSCSD6	Clarabel	optimal	optimal	0.0778214	2.106×10^{-8}	4.144×10^{-10}
QSCSD6	SCS	unknown	failed	1.90671	5.471×10^{-3}	1.077×10^{-4}
QSCSD6	OSQP	optimal	optimal	0.931167	4.205×10^{-4}	8.276×10^{-6}
QSCSD6	CCosmo	max_iters	failed	1.39319	0.0182433	3.591×10^{-4}
QSCSD6	CCosmo unenhanced	max_iters	failed	1.45938	0.0433274	8.528×10^{-4}
QSCSD6	COSMO.jl	optimal	optimal	1.5717	5.358×10^{-5}	1.055×10^{-6}
QSCSD6	COSMO.jl unenhanced	max_iters	failed	2.09416	0.0433859	8.539×10^{-4}
QSCSD6	SCS unenhanced	optimal	optimal	1.88356	0.0212076	4.174×10^{-4}
MOSARQP1	Clarabel	optimal	optimal	0.0723573	3.721×10^{-7}	3.905×10^{-10}
MOSARQP1	SCS	optimal	optimal	0.124069	4.308×10^{-7}	4.521×10^{-10}
MOSARQP1	OSQP	optimal	optimal	0.126083	2.031×10^{-6}	2.132×10^{-9}
MOSARQP1	CCosmo	optimal	optimal	0.447934	6.928×10^{-5}	7.271×10^{-8}
MOSARQP1	CCosmo unenhanced	optimal	optimal	0.684356	6.426×10^{-5}	6.744×10^{-8}
MOSARQP1	COSMO.jl	optimal	optimal	0.485782	2.194×10^{-5}	2.303×10^{-8}
MOSARQP1	COSMO.jl unenhanced	optimal	optimal	1.02788	6.313×10^{-5}	6.625×10^{-8}
MOSARQP1	SCS unenhanced	optimal	optimal	0.518813	6.436×10^{-6}	6.754×10^{-9}
QSHIP04L	Clarabel	optimal	optimal	0.101917	0.0134626	5.563×10^{-9}
QSHIP04L	SCS	unknown	failed	2.67991	2848.82	1.177×10^{-3}
QSHIP04L	OSQP	optimal	optimal	0.200223	2.925	1.209×10^{-6}
QSHIP04L	CCosmo	optimal	optimal	0.511129	0.688629	2.846×10^{-7}
QSHIP04L	CCosmo unenhanced	max_iters	failed	1.67226	1.933×10^{6}	0.798659
QSHIP04L	COSMO.jl	optimal	optimal	1.30149	47.6464	1.969×10^{-5}
QSHIP04L	COSMO.jl unenhanced	max_iters	failed	2.58682	1.933×10^{6}	0.7987
QSHIP04L	SCS unenhanced	optimal	failed	2.72395	5.636×10^{5}	0.232912
CVXQP2_M	Clarabel	optimal	optimal	0.339325	3.527×10^{-4}	4.301×10^{-10}
CVXQP2_M	SCS	optimal	optimal	0.17385	0.0832265	1.015×10^{-7}
CVXQP2_M	OSQP	optimal	optimal	0.149435	0.221738	2.704×10^{-7}
CVXQP2_M	CCosmo	optimal	optimal	0.070888	0.341678	4.166×10^{-7}
CVXQP2_M	CCosmo unenhanced	max_iters	failed	2.95472	1.217×10^{5}	0.148444
CVXQP2_M	COSMO.jl	optimal	optimal	0.373046	0.026481	3.229×10^{-8}
CVXQP2_M	COSMO.jl unenhanced	max_iters	failed	3.79064	1.218×10^{5}	0.148453
CVXQP2_M	SCS unenhanced	optimal	failed	3.75677	11069.3	0.0134966
DUAL2	Clarabel	optimal	optimal	0.0318236	5.578×10^{-11}	1.654×10^{-9}
DUAL2	SCS	optimal	optimal	1.700×10^{-3}	5.435×10^{-8}	1.611×10^{-6}
DUAL2	OSQP	optimal	optimal	0.0293618	4.080×10^{-7}	1.209×10^{-5}
DUAL2	CCosmo	optimal	optimal	1.075×10^{-3}	3.401×10^{-7}	1.008×10^{-5}
DUAL2	CCosmo unenhanced	optimal	optimal	0.0144811	1.059×10^{-6}	3.138×10^{-5}
DUAL2	COSMO.jl	optimal	optimal	5.018×10^{-3}	3.396×10^{-10}	1.007×10^{-8}
DUAL2	COSMO.jl unenhanced	optimal	optimal	0.019562	1.070×10^{-6}	3.173×10^{-5}
DUAL2	SCS unenhanced	optimal	optimal	5.994×10^{-3}	7.502×10^{-9}	2.224×10^{-7}
PRIMAL2	Clarabel	optimal	optimal	0.0496061	2.086×10^{-9}	6.185×10^{-8}
PRIMAL2	SCS	optimal	optimal	0.0177052	1.370×10^{-11}	4.062×10^{-10}
PRIMAL2	OSQP	optimal	optimal	0.0420327	2.272×10^{-11}	6.735×10^{-10}
PRIMAL2	CCosmo	optimal	optimal	5.272×10^{-3}	3.645×10^{-10}	1.080×10^{-8}
PRIMAL2	CCosmo unenhanced	optimal	optimal	2.252×10^{-3}	3.645×10^{-10}	1.080×10^{-8}
PRIMAL2	COSMO.jl	optimal	optimal	0.0177221	6.320×10^{-9}	1.874×10^{-7}
PRIMAL2	COSMO.jl unenhanced	optimal	optimal	7.597×10^{-3}	2.758×10^{-8}	8.176×10^{-7}
PRIMAL2	SCS unenhanced	optimal	optimal	0.0105761	2.853×10^{-8}	8.458×10^{-7}
LASER	Clarabel	optimal	optimal	0.0525661	7.420×10^{-3}	3.079×10^{-9}
LASER	SCS	optimal	optimal	0.0381108	5.983×10^{-3}	2.483×10^{-9}
LASER	OSQP	optimal	optimal	0.0418538	6.788×10^{-3}	2.817×10^{-9}
LASER	CCosmo	optimal	optimal	0.029528	44.1439	1.832×10^{-5}
LASER	CCosmo unenhanced	optimal	optimal	0.17012	46.9082	1.947×10^{-5}
LASER	COSMO.jl	optimal	optimal	0.149935	1.24938	5.185×10^{-7}
LASER	COSMO.jl unenhanced	optimal	optimal	0.276286	77.9668	3.236×10^{-5}
LASER	SCS unenhanced	optimal	optimal	0.736507	6.777×10^{-3}	2.812×10^{-9}
CVXQP1_M	Clarabel	optimal	optimal	0.623023	2.227×10^{-3}	2.048×10^{-9}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
CVXQP1_M	SCS	optimal	optimal	2.88999	1.31187	1.206×10^{-6}
CVXQP1_M	OSQP	optimal	optimal	2.27545	20.5472	1.889×10^{-5}
CVXQP1_M	CCosmo	optimal	optimal	1.97575	21.2515	1.954×10^{-5}
CVXQP1_M	CCosmo unenhanced	max_iters	failed	4.04161	1.831×10^{5}	0.168388
CVXQP1_M	COSMO.jl	optimal	optimal	2.54994	32.6142	2.999×10^{-5}
CVXQP1_M	COSMO.jl unenhanced	max_iters	failed	4.9975	1.831×10^{5}	0.168393
CVXQP1_M	SCS unenhanced	optimal	failed	4.72564	79549.6	0.0731483
QSIERRA	Clarabel	optimal	optimal	0.266241	0.127923	5.386×10^{-9}
QSIERRA	SCS	unknown	failed	4.85945	2.384×10^{6}	0.100396
QSIERRA	OSQP	max_iters	failed	3.53471	1.325×10^{6}	0.0557903
QSIERRA	CCosmo	max_iters	failed	3.40093	306.563	1.291×10^{-5}
QSIERRA	CCosmo unenhanced	max_iters	failed	3.30164	3.245×10^{6}	0.136613
QSIERRA	COSMO.jl	max_iters	failed	7.72236	3.802×10^{6}	0.160097
QSIERRA	COSMO.jl unenhanced	max_iters	failed	4.74324	3.245×10^{6}	0.136617
QSIERRA	SCS unenhanced	optimal	failed	4.88161	2.332×10^{6}	0.0981965
YAO	Clarabel	optimal	failed	0.156	76.1198	0.385018
YAO	SCS	unknown	failed	2.04251	186.212	0.941872
YAO	OSQP	max_iters	failed	1.41947	187.436	0.948064
YAO	CCosmo	max_iters	failed	1.34169	184.516	0.933295
YAO	CCosmo unenhanced	max_iters	failed	1.32514	195.742	0.990076
YAO	COSMO.jl	max_iters	failed	4.3459	184.238	0.931888
YAO	COSMO.jl unenhanced	max_iters	failed	2.0019	195.742	0.990076
YAO	SCS unenhanced	optimal	failed	2.01344	194.263	0.982594
QSCTAP2	Clarabel	optimal	optimal	0.0886205	2.130×10^{-6}	1.228×10^{-9}
QSCTAP2	SCS	optimal	optimal	0.343231	2.038×10^{-4}	1.175×10^{-7}
QSCTAP2	OSQP	optimal	optimal	1.88347	0.0402344	2.319×10^{-5}
QSCTAP2	CCosmo	max_iters	failed	1.8356	0.0513802	2.961×10^{-5}
QSCTAP2	CCosmo unenhanced	max_iters	failed	1.79004	0.400638	2.309×10^{-4}
QSCTAP2	COSMO.jl	optimal	optimal	0.640664	6.288×10^{-4}	3.624×10^{-7}
QSCTAP2	COSMO.jl unenhanced	max_iters	failed	2.96996	0.399477	2.302×10^{-4}
QSCTAP2	SCS unenhanced	optimal	optimal	1.42139	5.518×10^{-4}	3.180×10^{-7}
CVXQP3_M	Clarabel	optimal	optimal	0.879795	1.696×10^{-3}	1.245×10^{-9}
CVXQP3_M	SCS	unknown	failed	5.36539	56507.6	0.0414634
CVXQP3_M	OSQP	max_iters	failed	4.52039	3323.02	2.438×10^{-3}
CVXQP3_M	CCosmo	max_iters	failed	4.83071	2595.19	1.904×10^{-3}
CVXQP3_M	CCosmo unenhanced	max_iters	failed	4.71742	3.482×10^{5}	0.255489
CVXQP3_M	COSMO.jl	max_iters	failed	6.88598	9099.85	6.677×10^{-3}
CVXQP3_M	COSMO.jl unenhanced	max_iters	failed	5.41163	3.482×10^{5}	0.255491
CVXQP3_M	SCS unenhanced	optimal	failed	5.47673	2.954×10^{5}	0.216734
QFFFFF80	Clarabel	optimal	optimal	0.492161	1.255×10^{-3}	1.438×10^{-9}
QFFFFF80	SCS	unknown	failed	2.94549	2155.51	2.469×10^{-3}
QFFFFF80	OSQP	max_iters	failed	2.44223	1.059×10^{5}	0.121238
QFFFFF80	CCosmo	max_iters	failed	2.63992	28308.1	0.0324208
QFFFFF80	CCosmo unenhanced	max_iters	failed	2.41763	31321.7	0.0358722
QFFFFF80	COSMO.jl	max_iters	failed	3.71216	24822.1	0.0284283
QFFFFF80	COSMO.jl unenhanced	max_iters	failed	3.05616	31320	0.0358703
QFFFFF80	SCS unenhanced	optimal	failed	3.00065	25888.7	0.0296499
QGROW22	Clarabel	optimal	optimal	0.289156	0.431916	2.887×10^{-9}
QGROW22	SCS	unknown	failed	4.04885	1.939×10^{5}	1.296×10^{-3}
QGROW22	OSQP	max_iters	failed	3.33919	2.530×10^{5}	1.691×10^{-3}
QGROW22	CCosmo	max_iters	failed	3.51053	8.321×10^{7}	0.556101
QGROW22	CCosmo unenhanced	max_iters	failed	3.30563	2.948×10^{7}	0.197049
QGROW22	COSMO.jl	max_iters	failed	5.17949	1.835×10^{7}	0.122635
QGROW22	COSMO.jl unenhanced	max_iters	failed	4.08009	2.949×10^{7}	0.197061
QGROW22	SCS unenhanced	optimal	failed	4.10906	2.860×10^{7}	0.191134
QSCFXM3	Clarabel	optimal	optimal	0.217186	0.0682332	2.214×10^{-9}
QSCFXM3	SCS	unknown	failed	2.94587	6.232×10^{6}	0.202225
QSCFXM3	OSQP	max_iters	failed	2.19473	2.937×10^{7}	0.953227
QSCFXM3	CCosmo	max_iters	failed	2.26659	2.799×10^{6}	0.0908133
QSCFXM3	CCosmo unenhanced	max_iters	failed	1.88756	2.689×10^{7}	0.87269
QSCFXM3	COSMO.jl	max_iters	failed	4.32921	7.104×10^{6}	0.230529
QSCFXM3	COSMO.jl unenhanced	max_iters	failed	3.01881	2.689×10^{7}	0.8727
QSCFXM3	SCS unenhanced	optimal	failed	2.93866	5.983×10^{6}	0.194142
QETAMACR	Clarabel	optimal	optimal	0.357664	2.374×10^{-4}	2.737×10^{-9}
QETAMACR	SCS	unknown	failed	3.22765	7301.18	0.0841534
QETAMACR	OSQP	max_iters	failed	3.0607	9424.55	0.108627
QETAMACR	CCosmo	max_iters	failed	2.78931	73218.8	0.843919
QETAMACR	CCosmo unenhanced	max_iters	failed	2.80564	85612.7	0.986772
QETAMACR	COSMO.jl	optimal	failed	3.23238	7181.82	0.0827777
QETAMACR	COSMO.jl unenhanced	max_iters	failed	3.34751	85612.8	0.986773
QETAMACR	SCS unenhanced	optimal	failed	3.20914	47341.8	0.545661
DUAL3	Clarabel	optimal	optimal	0.0421014	1.360×10^{-9}	1.002×10^{-8}
DUAL3	SCS	optimal	optimal	2.251×10^{-3}	2.504×10^{-7}	1.845×10^{-6}
DUAL3	OSQP	optimal	optimal	0.0360663	2.497×10^{-6}	1.840×10^{-5}
DUAL3	CCosmo	optimal	optimal	5.464×10^{-3}	2.129×10^{-8}	1.569×10^{-7}
DUAL3	CCosmo unenhanced	optimal	optimal	0.078299	2.859×10^{-6}	2.106×10^{-5}
DUAL3	COSMO.jl	optimal	optimal	6.693×10^{-3}	3.205×10^{-8}	2.361×10^{-7}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
DUAL3	COSMO.jl unenhanced	optimal	optimal	0.101932	2.865×10^{-6}	2.111×10^{-5}
DUAL3	SCS unenhanced	optimal	optimal	0.0777856	2.805×10^{-6}	2.066×10^{-5}
AUG3D	Clarabel	optimal	optimal	0.336685	8.362×10^{-7}	1.509×10^{-9}
AUG3D	SCS	optimal	optimal	0.109337	1.832×10^{-7}	3.306×10^{-10}
AUG3D	OSQP	optimal	optimal	0.154753	6.503×10^{-3}	1.174×10^{-5}
AUG3D	CCosmo	optimal	optimal	0.179323	4.368×10^{-3}	7.883×10^{-6}
AUG3D	CCosmo unenhanced	optimal	optimal	0.174278	4.368×10^{-3}	7.883×10^{-6}
AUG3D	COSMO.jl	optimal	optimal	0.374145	1.839×10^{-6}	3.320×10^{-9}
AUG3D	COSMO.jl unenhanced	optimal	optimal	0.187011	4.812×10^{-3}	8.685×10^{-6}
AUG3D	SCS unenhanced	optimal	optimal	0.0614891	3.115×10^{-3}	5.623×10^{-6}
AUG3DQP	Clarabel	optimal	optimal	0.761593	1.206×10^{-7}	1.787×10^{-10}
AUG3DQP	SCS	optimal	optimal	0.270771	1.561×10^{-6}	2.311×10^{-9}
AUG3DQP	OSQP	optimal	optimal	0.173781	8.874×10^{-4}	1.314×10^{-6}
AUG3DQP	CCosmo	optimal	optimal	0.329252	0.0114601	1.697×10^{-5}
AUG3DQP	CCosmo unenhanced	optimal	optimal	0.833459	0.029669	4.394×10^{-5}
AUG3DQP	COSMO.jl	optimal	optimal	1.03695	4.571×10^{-4}	6.770×10^{-7}
AUG3DQP	COSMO.jl unenhanced	optimal	optimal	0.917372	0.0301264	4.462×10^{-5}
AUG3DQP	SCS unenhanced	optimal	optimal	0.348111	5.929×10^{-6}	8.780×10^{-9}
QSCTAP3	Clarabel	optimal	optimal	0.106453	1.230×10^{-6}	8.548×10^{-10}
QSCTAP3	SCS	optimal	optimal	0.600131	6.602×10^{-6}	4.589×10^{-9}
QSCTAP3	OSQP	optimal	optimal	0.743245	0.0135254	9.401×10^{-6}
QSCTAP3	CCosmo	optimal	optimal	2.37586	8.680×10^{-3}	6.033×10^{-6}
QSCTAP3	CCosmo unenhanced	max_iters	failed	2.4075	0.0671543	4.668×10^{-5}
QSCTAP3	COSMO.jl	optimal	optimal	1.17496	3.065×10^{-3}	2.130×10^{-6}
QSCTAP3	COSMO.jl unenhanced	max_iters	failed	3.40116	0.0670288	4.659×10^{-5}
QSCTAP3	SCS unenhanced	optimal	optimal	2.59601	3.950×10^{-4}	2.745×10^{-7}
STADAT1	Clarabel	optimal	optimal	0.0953737	0.244554	8.573×10^{-9}
STADAT1	SCS	unknown	failed	3.38776	1.349×10^{5}	4.728×10^{-3}
STADAT1	OSQP	max_iters	failed	2.04904	1.258×10^{5}	4.411×10^{-3}
STADAT1	CCosmo	max_iters	failed	2.12882	1.777×10^{5}	6.230×10^{-3}
STADAT1	CCosmo unenhanced	max_iters	failed	2.04691	1.433×10^{5}	5.024×10^{-3}
STADAT1	COSMO.jl	max_iters	failed	5.71842	1.757×10^{5}	6.160×10^{-3}
STADAT1	COSMO.jl unenhanced	max_iters	failed	2.94299	1.433×10^{5}	5.023×10^{-3}
STADAT1	SCS unenhanced	optimal	failed	3.46866	1.099×10^{5}	3.851×10^{-3}
STADAT2	Clarabel	optimal	optimal	0.234887	2.295×10^{-9}	7.033×10^{-11}
STADAT2	SCS	unknown	failed	3.44747	0.0932761	2.859×10^{-3}
STADAT2	OSQP	max_iters	failed	2.07777	1.82754	0.0560137
STADAT2	CCosmo	max_iters	failed	2.29904	3.796×10^{-4}	1.163×10^{-5}
STADAT2	CCosmo unenhanced	max_iters	failed	2.29207	0.0257101	7.880×10^{-4}
STADAT2	COSMO.jl	max_iters	failed	6.66234	2.91733	0.0894155
STADAT2	COSMO.jl unenhanced	max_iters	failed	2.97842	0.0257018	7.878×10^{-4}
STADAT2	SCS unenhanced	optimal	failed	3.41104	0.0238114	7.298×10^{-4}
AUG3DC	Clarabel	optimal	optimal	0.396379	2.255×10^{-7}	2.923×10^{-10}
AUG3DC	SCS	optimal	optimal	0.15515	3.197×10^{-7}	4.146×10^{-10}
AUG3DC	OSQP	optimal	optimal	0.159814	3.466×10^{-3}	4.493×10^{-6}
AUG3DC	CCosmo	optimal	optimal	0.185803	0.0110895	1.438×10^{-5}
AUG3DC	CCosmo unenhanced	optimal	optimal	0.18513	0.0110895	1.438×10^{-5}
AUG3DC	COSMO.jl	optimal	optimal	0.401914	9.433×10^{-7}	1.223×10^{-9}
AUG3DC	COSMO.jl unenhanced	optimal	optimal	0.210436	0.0120043	1.556×10^{-5}
AUG3DC	SCS unenhanced	optimal	optimal	0.0846839	1.140×10^{-8}	1.479×10^{-11}
AUG3DCQP	Clarabel	optimal	optimal	0.688732	6.223×10^{-7}	6.264×10^{-10}
AUG3DCQP	SCS	optimal	optimal	0.293771	5.841×10^{-4}	5.880×10^{-7}
AUG3DCQP	OSQP	optimal	optimal	0.198636	0.0202026	2.034×10^{-5}
AUG3DCQP	CCosmo	optimal	optimal	0.313136	0.0139397	1.403×10^{-5}
AUG3DCQP	CCosmo unenhanced	optimal	optimal	0.931307	0.0441136	4.441×10^{-5}
AUG3DCQP	COSMO.jl	optimal	optimal	1.01883	0.0130201	1.311×10^{-5}
AUG3DCQP	COSMO.jl unenhanced	optimal	optimal	1.09414	0.0359608	3.620×10^{-5}
AUG3DCQP	SCS unenhanced	optimal	optimal	0.329744	1.761×10^{-5}	1.772×10^{-8}
QPILOTNO	Clarabel	optimal	optimal	1.83929	3.271×10^{-3}	6.918×10^{-10}
QPILOTNO	SCS	unknown	failed	8.31883	5501.55	1.163×10^{-3}
QPILOTNO	OSQP	max_iters	failed	6.92155	12404.9	2.623×10^{-3}
QPILOTNO	CCosmo	max_iters	failed	15.7552	13506.1	2.856×10^{-3}
QPILOTNO	CCosmo unenhanced	max_iters	failed	15.7436	37002.6	7.825×10^{-3}
QPILOTNO	COSMO.jl	max_iters	failed	11.7293	9427.91	1.994×10^{-3}
QPILOTNO	COSMO.jl unenhanced	max_iters	failed	8.72834	37003.1	7.825×10^{-3}
QPILOTNO	SCS unenhanced	optimal	failed	8.30492	13513.6	2.858×10^{-3}
QSCSD8	Clarabel	optimal	optimal	0.141496	1.340×10^{-6}	1.424×10^{-9}
QSCSD8	SCS	unknown	failed	4.00007	1.651×10^{-4}	1.755×10^{-7}
QSCSD8	OSQP	max_iters	failed	3.0652	0.694633	7.384×10^{-4}
QSCSD8	CCosmo	max_iters	failed	2.80731	0.068656	7.298×10^{-5}
QSCSD8	CCosmo unenhanced	optimal	optimal	3.00158	6.165×10^{-3}	6.553×10^{-6}
QSCSD8	COSMO.jl	optimal	optimal	4.16548	0.10267	1.091×10^{-4}
QSCSD8	COSMO.jl unenhanced	optimal	optimal	3.69446	0.0149696	1.591×10^{-5}
QSCSD8	SCS unenhanced	optimal	optimal	2.91487	9.618×10^{-5}	1.022×10^{-7}
CONT-050	Clarabel	optimal	optimal	0.301267	6.275×10^{-9}	1.375×10^{-9}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
CONT-050	SCS	unknown	failed	11.0584	6.540×10^{-3}	1.433×10^{-3}
CONT-050	OSQP	max_iters	failed	8.11229	0.0343916	7.536×10^{-3}
CONT-050	CCosmo	max_iters	failed	16.1501	3.121×10^{-5}	6.838×10^{-6}
CONT-050	CCosmo unenhanced	optimal	optimal	6.55795	5.803×10^{-5}	1.271×10^{-5}
CONT-050	COSMO.jl	max_iters	failed	18.911	8.477×10^{-3}	1.857×10^{-3}
CONT-050	COSMO.jl unenhanced	optimal	optimal	2.6774	1.391×10^{-4}	3.047×10^{-5}
CONT-050	SCS unenhanced	optimal	optimal	2.97696	3.935×10^{-6}	8.622×10^{-7}
PRIMAL4	Clarabel	optimal	optimal	0.0983947	1.018×10^{-8}	1.365×10^{-8}
PRIMAL4	SCS	optimal	optimal	0.029722	8.289×10^{-8}	1.111×10^{-7}
PRIMAL4	OSQP	optimal	optimal	0.07997	1.280×10^{-8}	1.716×10^{-8}
PRIMAL4	CCosmo	optimal	optimal	0.0106887	1.920×10^{-8}	2.574×10^{-8}
PRIMAL4	CCosmo unenhanced	optimal	optimal	7.695×10^{-3}	1.920×10^{-8}	2.574×10^{-8}
PRIMAL4	COSMO.jl	optimal	optimal	0.0715899	1.280×10^{-8}	1.716×10^{-8}
PRIMAL4	COSMO.jl unenhanced	optimal	optimal	0.02983	2.495×10^{-8}	3.344×10^{-8}
PRIMAL4	SCS unenhanced	optimal	optimal	0.0258692	2.891×10^{-8}	3.875×10^{-8}
KSIP	Clarabel	optimal	optimal	0.0711374	4.014×10^{-11}	6.971×10^{-11}
KSIP	SCS	unknown	failed	0.975978	1.840×10^{-5}	3.196×10^{-5}
KSIP	OSQP	optimal	optimal	0.162904	1.198×10^{-5}	2.081×10^{-5}
KSIP	CCosmo	optimal	optimal	0.747033	2.409×10^{-9}	4.184×10^{-9}
KSIP	CCosmo unenhanced	max_iters	failed	0.77578	1.861×10^{-5}	3.232×10^{-5}
KSIP	COSMO.jl	optimal	optimal	0.325764	1.208×10^{-5}	2.098×10^{-5}
KSIP	COSMO.jl unenhanced	max_iters	failed	1.09605	1.861×10^{-5}	3.232×10^{-5}
KSIP	SCS unenhanced	optimal	optimal	0.952067	1.820×10^{-5}	3.160×10^{-5}
PRIMAL3	Clarabel	optimal	optimal	0.11406	1.774×10^{-9}	1.307×10^{-8}
PRIMAL3	SCS	optimal	optimal	0.0320254	2.556×10^{-7}	1.883×10^{-6}
PRIMAL3	OSQP	optimal	optimal	0.0840964	8.660×10^{-10}	6.379×10^{-9}
PRIMAL3	CCosmo	optimal	optimal	0.0550954	2.166×10^{-8}	1.596×10^{-7}
PRIMAL3	CCosmo unenhanced	optimal	optimal	0.0556958	2.166×10^{-8}	1.596×10^{-7}
PRIMAL3	COSMO.jl	optimal	optimal	0.0415261	8.658×10^{-10}	6.378×10^{-9}
PRIMAL3	COSMO.jl unenhanced	optimal	optimal	0.0292211	4.248×10^{-8}	3.129×10^{-7}
PRIMAL3	SCS unenhanced	optimal	optimal	0.0288747	4.555×10^{-9}	3.356×10^{-8}
STADAT3	Clarabel	optimal	optimal	0.570583	2.426×10^{-7}	6.781×10^{-9}
STADAT3	SCS	unknown	failed	7.33116	0.52416	0.0146497
STADAT3	OSQP	max_iters	failed	4.29491	2.34988	0.0656768
STADAT3	CCosmo	max_iters	failed	16.1479	6.509×10^{-3}	1.819×10^{-4}
STADAT3	CCosmo unenhanced	max_iters	failed	15.8023	0.182639	5.105×10^{-3}
STADAT3	COSMO.jl	max_iters	failed	15.8925	3.07468	0.0859343
STADAT3	COSMO.jl unenhanced	max_iters	failed	6.99327	0.182653	5.105×10^{-3}
STADAT3	SCS unenhanced	optimal	failed	7.84538	0.162915	4.553×10^{-3}
QSHIP08S	Clarabel	optimal	optimal	0.196937	0.0219379	9.195×10^{-9}
QSHIP08S	SCS	unknown	failed	4.55477	146.239	6.130×10^{-5}
QSHIP08S	OSQP	optimal	optimal	0.732037	21.5271	9.023×10^{-6}
QSHIP08S	CCosmo	optimal	optimal	0.842057	0.283714	1.189×10^{-7}
QSHIP08S	CCosmo unenhanced	max_iters	failed	3.38987	2.299×10^{6}	0.963834
QSHIP08S	COSMO.jl	optimal	optimal	2.73562	73.1957	3.068×10^{-5}
QSHIP08S	COSMO.jl unenhanced	max_iters	failed	4.55312	2.299×10^{6}	0.963836
QSHIP08S	SCS unenhanced	optimal	failed	4.22207	6.734×10^{5}	0.282282
HUES-MOD	Clarabel	optimal	optimal	0.287085	226.321	6.499×10^{-6}
HUES-MOD	SCS	prim_infeas	failed	0.0296641	–	–
HUES-MOD	OSQP	max_iters	failed	6.32966	1.009×10^{7}	0.289836
HUES-MOD	CCosmo	optimal	optimal	4.88005	214.365	6.156×10^{-6}
HUES-MOD	CCosmo unenhanced	max_iters	failed	16.3949	4.540×10^{5}	0.0130374
HUES-MOD	COSMO.jl	max_iters	failed	20.576	1.025×10^{6}	0.0294367
HUES-MOD	COSMO.jl unenhanced	max_iters	failed	10.1845	4.541×10^{5}	0.0130402
HUES-MOD	SCS unenhanced	prim_infeas	failed	0.0113344	–	–
HUESTIS	Clarabel	prim_infeas	failed	0.124555	–	–
HUESTIS	SCS	prim_infeas	failed	0.0348192	–	–
HUESTIS	OSQP	max_iters	failed	6.44964	6.492×10^{10}	0.186424
HUESTIS	CCosmo	max_iters	failed	15.6326	2.550×10^{7}	7.321×10^{-5}
HUESTIS	CCosmo unenhanced	max_iters	failed	15.5675	3.482×10^{11}	0.999749
HUESTIS	COSMO.jl	max_iters	failed	19.5337	1.828×10^{11}	0.524978
HUESTIS	COSMO.jl unenhanced	max_iters	failed	9.30951	3.482×10^{11}	0.999749
HUESTIS	SCS unenhanced	prim_infeas	failed	0.0116061	–	–
POWELL20	Clarabel	prim_infeas	failed	0.315695	–	–
POWELL20	SCS	prim_infeas	failed	0.0253266	–	–
POWELL20	OSQP	max_iters	failed	27.9763	7.588×10^{9}	0.145681
POWELL20	CCosmo	max_iters	failed	10.9925	3.735×10^{9}	0.0717016
POWELL20	CCosmo unenhanced	max_iters	failed	6.58725	1.025×10^{10}	0.196829
POWELL20	COSMO.jl	max_iters	failed	22.1674	1.468×10^{9}	0.0281802
POWELL20	COSMO.jl unenhanced	max_iters	failed	9.62954	1.025×10^{10}	0.19683
POWELL20	SCS unenhanced	prim_infeas	failed	0.0115326	–	–
QSHIP12S	Clarabel	optimal	optimal	0.252642	0.0353619	1.157×10^{-8}
QSHIP12S	SCS	unknown	failed	5.78897	3037	9.935×10^{-4}
QSHIP12S	OSQP	optimal	optimal	2.83735	43.6779	1.429×10^{-5}
QSHIP12S	CCosmo	optimal	optimal	2.013	7.39264	2.418×10^{-6}
QSHIP12S	CCosmo unenhanced	max_iters	failed	3.9418	2.654×10^{6}	0.868059

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
QSHIP12S	COSMO.jl	optimal	optimal	7.31588	1502.55	4.915×10^{-4}
QSHIP12S	COSMO.jl unenhanced	max_iters	failed	5.49915	2.654×10^{6}	0.868074
QSHIP12S	SCS unenhanced	optimal	failed	5.69728	6.161×10^{5}	0.201545
LISWET1	Clarabel	optimal	failed	1.71628	9.82139	0.271892
LISWET1	SCS	optimal	failed	8.62183	11.1167	0.30775
LISWET1	OSQP	optimal	failed	7.06206	11.1187	0.307805
LISWET1	CCosmo	optimal	failed	14.2606	11.12	0.307843
LISWET1	CCosmo unenhanced	max_iters	failed	15.2035	11.1224	0.30791
LISWET1	COSMO.jl	optimal	failed	8.41914	11.1169	0.307757
LISWET1	COSMO.jl unenhanced	max_iters	failed	11.1399	11.1224	0.30791
LISWET1	SCS unenhanced	optimal	failed	11.2295	11.1212	0.307875
LISWET10	Clarabel	optimal	failed	0.522629	24.3062	0.491176
LISWET10	SCS	optimal	failed	5.46698	24.4838	0.494765
LISWET10	OSQP	optimal	failed	0.851427	24.4842	0.494773
LISWET10	CCosmo	optimal	failed	3.82127	24.4843	0.494774
LISWET10	CCosmo unenhanced	max_iters	failed	15.5013	24.4855	0.494799
LISWET10	COSMO.jl	optimal	failed	4.65058	24.4838	0.494765
LISWET10	COSMO.jl unenhanced	max_iters	failed	10.9478	24.4855	0.494799
LISWET10	SCS unenhanced	optimal	failed	10.7135	24.4845	0.494779
LISWET11	Clarabel	optimal	failed	2.05415	12.9966	0.262431
LISWET11	SCS	unknown	failed	10.9064	24.5243	0.495201
LISWET11	OSQP	optimal	failed	5.54153	24.5244	0.495203
LISWET11	CCosmo	optimal	failed	4.11167	24.525	0.495216
LISWET11	CCosmo unenhanced	max_iters	failed	15.607	24.5262	0.49524
LISWET11	COSMO.jl	optimal	failed	4.72337	24.5245	0.495205
LISWET11	COSMO.jl unenhanced	max_iters	failed	10.6288	24.5262	0.49524
LISWET11	SCS unenhanced	optimal	failed	11.1864	24.5252	0.495219
LISWET12	Clarabel	optimal	failed	1.57978	1500.91	0.864116
LISWET12	SCS	unknown	failed	10.9602	1711.91	0.985596
LISWET12	OSQP	optimal	failed	6.8465	1711.93	0.985607
LISWET12	CCosmo	optimal	failed	4.53307	1711.93	0.985608
LISWET12	CCosmo unenhanced	max_iters	failed	16.1637	1711.93	0.985608
LISWET12	COSMO.jl	optimal	failed	5.23381	1711.93	0.985608
LISWET12	COSMO.jl unenhanced	max_iters	failed	11.7945	1711.93	0.985608
LISWET12	SCS unenhanced	optimal	failed	10.662	1711.93	0.985608
LISWET2	Clarabel	optimal	optimal	0.316577	7.956×10^{-6}	3.183×10^{-7}
LISWET2	SCS	optimal	optimal	6.1808	5.603×10^{-4}	2.241×10^{-5}
LISWET2	OSQP	optimal	optimal	4.44898	4.491×10^{-4}	1.797×10^{-5}
LISWET2	CCosmo	optimal	optimal	4.16187	1.020×10^{-3}	4.080×10^{-5}
LISWET2	CCosmo unenhanced	max_iters	failed	16.444	2.293×10^{-3}	9.172×10^{-5}
LISWET2	COSMO.jl	optimal	optimal	4.60796	6.293×10^{-4}	2.517×10^{-5}
LISWET2	COSMO.jl unenhanced	max_iters	failed	11.4026	2.293×10^{-3}	9.172×10^{-5}
LISWET2	SCS unenhanced	optimal	optimal	10.491	1.294×10^{-3}	5.176×10^{-5}
LISWET3	Clarabel	optimal	optimal	0.36719	1.393×10^{-6}	5.574×10^{-8}
LISWET3	SCS	optimal	optimal	5.71534	4.348×10^{-4}	1.739×10^{-5}
LISWET3	OSQP	optimal	optimal	4.55083	2.923×10^{-4}	1.169×10^{-5}
LISWET3	CCosmo	optimal	optimal	3.84828	8.809×10^{-4}	3.523×10^{-5}
LISWET3	CCosmo unenhanced	max_iters	failed	16.0659	2.152×10^{-3}	8.609×10^{-5}
LISWET3	COSMO.jl	optimal	optimal	5.60233	4.992×10^{-4}	1.997×10^{-5}
LISWET3	COSMO.jl unenhanced	max_iters	failed	10.7196	2.152×10^{-3}	8.609×10^{-5}
LISWET3	SCS unenhanced	optimal	optimal	11.5161	1.156×10^{-3}	4.623×10^{-5}
LISWET4	Clarabel	optimal	optimal	0.437446	9.621×10^{-6}	3.849×10^{-7}
LISWET4	SCS	optimal	optimal	5.97129	4.455×10^{-4}	1.782×10^{-5}
LISWET4	OSQP	optimal	optimal	4.91047	3.137×10^{-4}	1.255×10^{-5}
LISWET4	CCosmo	optimal	optimal	3.87641	8.877×10^{-4}	3.551×10^{-5}
LISWET4	CCosmo unenhanced	max_iters	failed	15.3332	2.158×10^{-3}	8.633×10^{-5}
LISWET4	COSMO.jl	optimal	optimal	4.92308	4.365×10^{-4}	1.746×10^{-5}
LISWET4	COSMO.jl unenhanced	max_iters	failed	10.7101	2.158×10^{-3}	8.633×10^{-5}
LISWET4	SCS unenhanced	optimal	optimal	12.0616	1.163×10^{-3}	4.651×10^{-5}
LISWET5	Clarabel	optimal	optimal	0.24643	2.706×10^{-5}	1.081×10^{-6}
LISWET5	SCS	optimal	optimal	5.83995	3.144×10^{-4}	1.256×10^{-5}
LISWET5	OSQP	optimal	optimal	0.640973	7.377×10^{-4}	2.947×10^{-5}
LISWET5	CCosmo	optimal	optimal	3.97555	8.877×10^{-4}	3.546×10^{-5}
LISWET5	CCosmo unenhanced	max_iters	failed	15.736	2.159×10^{-3}	8.625×10^{-5}
LISWET5	COSMO.jl	optimal	optimal	5.49004	5.292×10^{-4}	2.114×10^{-5}
LISWET5	COSMO.jl unenhanced	max_iters	failed	10.751	2.159×10^{-3}	8.625×10^{-5}
LISWET5	SCS unenhanced	optimal	optimal	11.1789	9.983×10^{-4}	3.988×10^{-5}
LISWET6	Clarabel	optimal	optimal	0.33074	1.943×10^{-5}	7.775×10^{-7}
LISWET6	SCS	optimal	optimal	4.98102	5.117×10^{-4}	2.047×10^{-5}
LISWET6	OSQP	optimal	optimal	0.732767	9.138×10^{-4}	3.656×10^{-5}
LISWET6	CCosmo	optimal	optimal	3.66681	9.259×10^{-4}	3.704×10^{-5}
LISWET6	CCosmo unenhanced	max_iters	failed	15.6544	2.198×10^{-3}	8.795×10^{-5}
LISWET6	COSMO.jl	optimal	optimal	5.60636	3.684×10^{-4}	1.474×10^{-5}
LISWET6	COSMO.jl unenhanced	max_iters	failed	10.4954	2.198×10^{-3}	8.795×10^{-5}
LISWET6	SCS unenhanced	optimal	optimal	10.3543	1.200×10^{-3}	4.802×10^{-5}
LISWET7	Clarabel	optimal	failed	2.03772	456.776	0.915674
LISWET7	SCS	unknown	failed	10.2962	473.838	0.949879
LISWET7	OSQP	optimal	failed	4.02234	473.838	0.949879

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
LISWET7	CCosmo	optimal	failed	4.55937	473.839	0.94988
LISWET7	CCosmo unenhanced	max_iters	failed	15.5468	473.84	0.949883
LISWET7	COSMO.jl	optimal	failed	5.63684	473.839	0.949879
LISWET7	COSMO.jl unenhanced	max_iters	failed	11.5778	473.84	0.949883
LISWET7	SCS unenhanced	optimal	failed	10.8997	473.839	0.94988
LISWET8	Clarabel	optimal	failed	2.08588	659.216	0.922664
LISWET8	SCS	unknown	failed	10.3652	689.467	0.965005
LISWET8	OSQP	optimal	failed	3.77369	689.468	0.965006
LISWET8	CCosmo	optimal	failed	3.89393	689.468	0.965006
LISWET8	CCosmo unenhanced	max_iters	failed	15.1348	689.469	0.965008
LISWET8	COSMO.jl	optimal	failed	4.43166	689.468	0.965006
LISWET8	COSMO.jl unenhanced	max_iters	failed	10.4277	689.469	0.965008
LISWET8	SCS unenhanced	optimal	failed	10.4498	689.468	0.965007
LISWET9	Clarabel	optimal	failed	1.93901	1415.35	0.720922
LISWET9	SCS	unknown	failed	10.5998	1938.21	0.987247
LISWET9	OSQP	optimal	failed	4.01225	1938.25	0.987265
LISWET9	CCosmo	optimal	failed	4.57918	1938.25	0.987265
LISWET9	CCosmo unenhanced	max_iters	failed	16.9095	1938.25	0.987266
LISWET9	COSMO.jl	optimal	failed	5.7493	1938.25	0.987265
LISWET9	COSMO.jl unenhanced	max_iters	failed	11.285	1938.25	0.987266
LISWET9	SCS unenhanced	optimal	failed	10.2011	1938.25	0.987265
CONT-101	Clarabel	optimal	optimal	9.58677	6.651×10^{-9}	3.402×10^{-8}
CONT-101	SCS	unknown	failed	79.7412	0.323782	1.65594
CONT-101	OSQP	max_iters	failed	60.1222	0.317761	1.62515
CONT-101	CCosmo	max_iters	failed	67.8407	0.173693	0.888333
CONT-101	CCosmo unenhanced	max_iters	failed	67.9542	0.055322	0.282937
CONT-101	COSMO.jl	max_iters	failed	135.918	0.324644	1.66035
CONT-101	COSMO.jl unenhanced	max_iters	failed	80.9824	0.0553201	0.282927
CONT-101	SCS unenhanced	optimal	failed	77.337	0.0497317	0.254347
DTOC3	Clarabel	optimal	optimal	0.418463	8.013×10^{-7}	3.406×10^{-9}
DTOC3	SCS	unknown	failed	18.6722	3.26922	0.013896
DTOC3	OSQP	max_iters	failed	11.4564	11.6593	0.0495587
DTOC3	CCosmo	optimal	optimal	0.467241	8.972×10^{-4}	3.813×10^{-6}
DTOC3	CCosmo unenhanced	max_iters	failed	21.0554	164.838	0.700658
DTOC3	COSMO.jl	unknown	failed	45.5897	111.958	0.475887
DTOC3	COSMO.jl unenhanced	max_iters	failed	20.3096	164.841	0.700669
DTOC3	SCS unenhanced	optimal	failed	18.5283	2.22148	9.443×10^{-3}
STCQP1	Clarabel	optimal	optimal	0.823224	2.362×10^{-4}	1.522×10^{-9}
STCQP1	SCS	optimal	optimal	0.228203	2.437×10^{-3}	1.571×10^{-8}
STCQP1	OSQP	optimal	optimal	0.293791	0.171643	1.106×10^{-6}
STCQP1	CCosmo	optimal	optimal	0.279892	1.294×10^{-3}	8.342×10^{-9}
STCQP1	CCosmo unenhanced	max_iters	failed	17.0132	25.2867	1.630×10^{-4}
STCQP1	COSMO.jl	optimal	optimal	3.43102	0.0185217	1.194×10^{-7}
STCQP1	COSMO.jl unenhanced	max_iters	failed	10.5294	25.2981	1.631×10^{-4}
STCQP1	SCS unenhanced	optimal	optimal	3.12296	3.180×10^{-4}	2.049×10^{-9}
STCQP2	Clarabel	optimal	optimal	1.02317	6.881×10^{-6}	3.082×10^{-10}
STCQP2	SCS	optimal	optimal	0.535707	9.722×10^{-3}	4.354×10^{-7}
STCQP2	OSQP	optimal	optimal	0.456576	0.088055	3.944×10^{-6}
STCQP2	CCosmo	optimal	optimal	0.393416	0.0313014	1.402×10^{-6}
STCQP2	CCosmo unenhanced	max_iters	failed	18.7617	4.63818	2.077×10^{-4}
STCQP2	COSMO.jl	optimal	optimal	3.59828	0.0139108	6.230×10^{-7}
STCQP2	COSMO.jl unenhanced	max_iters	failed	16.6266	4.63949	2.078×10^{-4}
STCQP2	SCS unenhanced	optimal	optimal	6.46425	5.721×10^{-5}	2.562×10^{-9}
CONT-100	Clarabel	optimal	optimal	6.963	1.539×10^{-8}	3.313×10^{-9}
CONT-100	SCS	unknown	failed	76.0094	0.0497184	0.010705
CONT-100	OSQP	max_iters	failed	59.6678	0.0504269	0.0108576
CONT-100	CCosmo	max_iters	failed	68.6666	3.323×10^{-3}	7.154×10^{-4}
CONT-100	CCosmo unenhanced	max_iters	failed	67.89	1.514×10^{-4}	3.260×10^{-5}
CONT-100	COSMO.jl	max_iters	failed	141.697	0.0486059	0.0104655
CONT-100	COSMO.jl unenhanced	optimal	optimal	52.1215	2.082×10^{-3}	4.482×10^{-4}
CONT-100	SCS unenhanced	optimal	optimal	77.5671	5.117×10^{-4}	1.102×10^{-4}
UBH1	Clarabel	optimal	optimal	0.879935	3.818×10^{-4}	3.421×10^{-4}
UBH1	SCS	unknown	failed	34.8917	0.01194	0.0106989
UBH1	OSQP	max_iters	failed	24.689	0.0389506	0.034902
UBH1	CCosmo	max_iters	failed	27.6027	1.003×10^{-6}	8.986×10^{-7}
UBH1	CCosmo unenhanced	max_iters	failed	27.1293	1.003×10^{-6}	8.986×10^{-7}
UBH1	COSMO.jl	max_iters	failed	91.2583	0.0879403	0.0787995
UBH1	COSMO.jl unenhanced	optimal	failed	1.84336	0.505974	0.453381
UBH1	SCS unenhanced	optimal	optimal	3.39986	1.174×10^{-6}	1.052×10^{-6}
QSHELL	Clarabel	optimal	optimal	1.2652	8326.25	5.294×10^{-9}
QSHELL	SCS	optimal	optimal	1.95074	2.103×10^{8}	1.337×10^{-4}
QSHELL	OSQP	max_iters	failed	4.68114	1.415×10^{9}	9.000×10^{-4}
QSHELL	CCosmo	max_iters	failed	4.66421	3.591×10^{6}	2.284×10^{-6}
QSHELL	CCosmo unenhanced	max_iters	failed	4.52392	9.397×10^{11}	0.597515
QSHELL	COSMO.jl	optimal	failed	5.5101	1.396×10^{9}	8.874×10^{-4}
QSHELL	COSMO.jl unenhanced	max_iters	failed	5.86366	9.397×10^{11}	0.597533
QSHELL	SCS unenhanced	optimal	failed	5.73757	2.949×10^{11}	0.187535
AUG2D	Clarabel	optimal	optimal	1.00256	3.095×10^{-3}	1.834×10^{-9}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
AUG2D	SCS	optimal	optimal	5.50737	0.125928	7.463×10^{-8}
AUG2D	OSQP	optimal	optimal	0.631554	4.468×10^{-4}	2.648×10^{-10}
AUG2D	CCosmo	optimal	optimal	0.925986	2.98209	1.767×10^{-6}
AUG2D	CCosmo unenhanced	max_iters	failed	48.1543	1.025×10^{5}	0.0607393
AUG2D	COSMO.jl	optimal	optimal	16.329	2.895×10^{-3}	1.716×10^{-9}
AUG2D	COSMO.jl unenhanced	max_iters	failed	52.8755	1.025×10^{5}	0.0607514
AUG2D	SCS unenhanced	prim_infeas	failed	50.0214	–	–
AUG2DQP	Clarabel	optimal	optimal	5.50269	0.0214701	3.442×10^{-9}
AUG2DQP	SCS	optimal	optimal	31.8419	6.50171	1.042×10^{-6}
AUG2DQP	OSQP	optimal	optimal	18.3056	106.729	1.711×10^{-5}
AUG2DQP	CCosmo	optimal	optimal	17.7572	96.5505	1.548×10^{-5}
AUG2DQP	CCosmo unenhanced	max_iters	failed	80.5543	3.953×10^{6}	0.633842
AUG2DQP	COSMO.jl	optimal	optimal	61.8132	615.235	9.864×10^{-5}
AUG2DQP	COSMO.jl unenhanced	max_iters	failed	96.3977	3.953×10^{6}	0.633865
AUG2DQP	SCS unenhanced	optimal	failed	88.6942	45810.7	7.345×10^{-3}
AUG2DC	Clarabel	optimal	optimal	0.954276	4.161×10^{-3}	2.288×10^{-9}
AUG2DC	SCS	optimal	optimal	5.36846	0.0133908	7.364×10^{-9}
AUG2DC	OSQP	optimal	optimal	0.703515	5.116×10^{-3}	2.813×10^{-9}
AUG2DC	CCosmo	optimal	optimal	1.02922	0.617346	3.395×10^{-7}
AUG2DC	CCosmo unenhanced	max_iters	failed	48.5287	1.262×10^{5}	0.0693964
AUG2DC	COSMO.jl	optimal	optimal	15.8957	0.140472	7.725×10^{-8}
AUG2DC	COSMO.jl unenhanced	max_iters	failed	50.3505	1.262×10^{5}	0.0694096
AUG2DC	SCS unenhanced	prim_infeas	failed	46.9388	–	–
AUG2DCQP	Clarabel	optimal	optimal	4.97268	8.973×10^{-3}	1.381×10^{-9}
AUG2DCQP	SCS	optimal	optimal	36.1116	5.099×10^{-3}	7.846×10^{-10}
AUG2DCQP	OSQP	optimal	optimal	22.8403	123.436	1.900×10^{-5}
AUG2DCQP	CCosmo	optimal	optimal	16.9092	57.218	8.805×10^{-6}
AUG2DCQP	CCosmo unenhanced	max_iters	failed	80.6083	4.170×10^{6}	0.641696
AUG2DCQP	COSMO.jl	optimal	optimal	69.5293	499.806	7.692×10^{-5}
AUG2DCQP	COSMO.jl unenhanced	max_iters	failed	95.7792	4.170×10^{6}	0.641719
AUG2DCQP	SCS unenhanced	optimal	failed	91.0738	54512.6	8.389×10^{-3}
QSHIP08L	Clarabel	optimal	optimal	1.09281	0.0160795	6.767×10^{-9}
QSHIP08L	SCS	unknown	failed	12.174	1544.68	6.501×10^{-4}
QSHIP08L	OSQP	optimal	optimal	1.68572	9.5183	4.006×10^{-6}
QSHIP08L	CCosmo	optimal	optimal	4.33577	2.57781	1.085×10^{-6}
QSHIP08L	CCosmo unenhanced	max_iters	failed	16.8341	2.311×10^{6}	0.972575
QSHIP08L	COSMO.jl	optimal	optimal	9.58567	204.496	8.607×10^{-5}
QSHIP08L	COSMO.jl unenhanced	max_iters	failed	13.1167	2.311×10^{6}	0.972574
QSHIP08L	SCS unenhanced	optimal	failed	12.4575	7.265×10^{5}	0.305776
CVXQP2_L	Clarabel	optimal	optimal	8.36059	0.0115418	1.410×10^{-10}
CVXQP2_L	SCS	optimal	optimal	32.2042	3.00009	3.666×10^{-8}
CVXQP2_L	OSQP	optimal	optimal	34.8628	10.383	1.269×10^{-7}
CVXQP2_L	CCosmo	optimal	optimal	23.0298	0.159252	1.946×10^{-9}
CVXQP2_L	CCosmo unenhanced	max_iters	failed	186.288	6.300×10^{7}	0.769714
CVXQP2_L	COSMO.jl	optimal	optimal	44.1311	1.12865	1.379×10^{-8}
CVXQP2_L	COSMO.jl unenhanced	max_iters	failed	209.107	6.300×10^{7}	0.769727
CVXQP2_L	SCS unenhanced	optimal	failed	206.84	1.238×10^{7}	0.151206
CVXQP1_L	Clarabel	optimal	optimal	18.5387	0.0659527	6.067×10^{-10}
CVXQP1_L	SCS	unknown	failed	288.599	2.498×10^{6}	0.0229777
CVXQP1_L	OSQP	max_iters	failed	268.746	2.787×10^{6}	0.0256363
CVXQP1_L	CCosmo	max_iters	failed	307.895	1.127×10^{6}	0.0103658
CVXQP1_L	CCosmo unenhanced	max_iters	failed	280.234	6.690×10^{7}	0.61544
CVXQP1_L	COSMO.jl	max_iters	failed	362.041	5.045×10^{5}	4.641×10^{-3}
CVXQP1_L	COSMO.jl unenhanced	max_iters	failed	277.706	6.690×10^{7}	0.615457
CVXQP1_L	SCS unenhanced	optimal	failed	270.502	1.933×10^{7}	0.177787
CVXQP3_L	Clarabel	optimal	optimal	20.841	0.585578	5.061×10^{-9}
CVXQP3_L	SCS	unknown	failed	315.973	2.851×10^{6}	0.0246382
CVXQP3_L	OSQP	max_iters	failed	309.508	1.948×10^{6}	0.0168311
CVXQP3_L	CCosmo	max_iters	failed	328.967	2.484×10^{6}	0.0214687
CVXQP3_L	CCosmo unenhanced	max_iters	failed	294.633	5.389×10^{7}	0.465751
CVXQP3_L	COSMO.jl	max_iters	failed	409.823	7.595×10^{5}	6.564×10^{-3}
CVXQP3_L	COSMO.jl unenhanced	max_iters	failed	309.775	5.389×10^{7}	0.46577
CVXQP3_L	SCS unenhanced	optimal	failed	294.494	1.541×10^{7}	0.133152
Q25FV47	Clarabel	optimal	optimal	1.30597	0.0904106	6.578×10^{-9}
Q25FV47	SCS	unknown	failed	9.8064	49617.8	3.610×10^{-3}
Q25FV47	OSQP	max_iters	failed	8.76975	4563.4	3.320×10^{-4}
Q25FV47	CCosmo	max_iters	failed	7.45737	8.403×10^{5}	0.0611372
Q25FV47	CCosmo unenhanced	max_iters	failed	7.75899	7.789×10^{6}	0.566672
Q25FV47	COSMO.jl	max_iters	failed	11.5401	610.26	4.440×10^{-5}
Q25FV47	COSMO.jl unenhanced	max_iters	failed	9.53457	7.789×10^{6}	0.566689
Q25FV47	SCS unenhanced	optimal	failed	9.33802	9.663×10^{5}	0.0703066
QSHIP12L	Clarabel	optimal	optimal	1.73645	1.344×10^{-3}	4.451×10^{-10}
QSHIP12L	SCS	unknown	failed	20.9103	10138.6	3.358×10^{-3}
QSHIP12L	OSQP	optimal	optimal	9.1038	36.053	1.194×10^{-5}
QSHIP12L	CCosmo	optimal	optimal	11.7308	13.1313	4.350×10^{-6}

Instance	Solver	Raw status	Normalized status	Time [s]	Abs. error	Rel. error
QSHIP12L	CCosmo unenhanced	max_iters	failed	23.1703	2.651×10^{6}	0.878083
QSHIP12L	COSMO.jl	max_iters	failed	31.7433	213.838	7.083×10^{-5}
QSHIP12L	COSMO.jl unenhanced	max_iters	failed	20.7112	2.651×10^{6}	0.878099
QSHIP12L	SCS unenhanced	optimal	failed	21.2315	7.306×10^{5}	0.242007
CONT-201	Clarabel	optimal	optimal	49.0457	6.591×10^{-11}	3.424×10^{-10}
CONT-201	SCS	unknown	failed	402.2	0.319649	1.66066
CONT-201	OSQP	max_iters	failed	327.759	0.318032	1.65226
CONT-201	CCosmo	max_iters	failed	352.784	1.02133	5.30606
CONT-201	CCosmo unenhanced	max_iters	failed	352.106	0.53096	2.75847
CONT-201	COSMO.jl	max_iters	failed	1066.77	0.319741	1.66114
CONT-201	COSMO.jl unenhanced	max_iters	failed	396.514	0.530975	2.75855
CONT-201	SCS unenhanced	optimal	failed	388.123	0.503178	2.61414
CONT-200	Clarabel	optimal	optimal	37.1652	2.182×10^{-8}	4.657×10^{-9}
CONT-200	SCS	unknown	failed	404.377	0.0614872	0.0131246
CONT-200	OSQP	max_iters	failed	324.583	0.0587723	0.0125451
CONT-200	CCosmo	max_iters	failed	349.892	0.0459801	9.815×10^{-3}
CONT-200	CCosmo unenhanced	max_iters	failed	351.25	0.0104182	2.224×10^{-3}
CONT-200	COSMO.jl	max_iters	failed	1047.11	0.0683585	0.0145913
CONT-200	COSMO.jl unenhanced	max_iters	failed	385.63	0.010416	2.223×10^{-3}
CONT-200	SCS unenhanced	optimal	failed	392.61	0.0126657	2.704×10^{-3}
BOYD2	Clarabel	max_iters	failed	47.3415	44.3466	2.08623
BOYD2	SCS	unknown	failed	254.856	12027.5	565.818
BOYD2	OSQP	unknown	failed	12.8803	–	–
BOYD2	CCosmo	max_iters	failed	174.632	118.337	5.56701
BOYD2	CCosmo unenhanced	max_iters	failed	186.121	21.2568	1
BOYD2	COSMO.jl	max_iters	failed	1973.05	46571.3	2190.89
BOYD2	COSMO.jl unenhanced	unknown	failed	4.29573	–	–
BOYD2	SCS unenhanced	unknown	failed	0.833476	–	–
CONT-300	Clarabel	optimal	optimal	105.231	3.553×10^{-8}	1.855×10^{-7}
CONT-300	SCS	unknown	failed	1024.13	0.31788	1.65984
CONT-300	OSQP	max_iters	failed	857.093	0.317205	1.65632
CONT-300	CCosmo	max_iters	failed	890.839	1.32957	6.94246
CONT-300	CCosmo unenhanced	max_iters	failed	888.842	1.1422	5.9641
CONT-300	COSMO.jl	max_iters	failed	3913.02	0.318	1.66047
CONT-300	COSMO.jl unenhanced	max_iters	failed	958.046	1.14223	5.96427
CONT-300	SCS unenhanced	optimal	failed	999.073	1.14259	5.96615
BOYD1	Clarabel	prim_infeas	failed	3.11097	–	–
BOYD1	SCS	optimal	optimal	13.7165	1990.43	3.224×10^{-5}
BOYD1	OSQP	unknown	failed	29.8661	–	–
BOYD1	CCosmo	max_iters	failed	222.254	6.90212	1.118×10^{-7}
BOYD1	CCosmo unenhanced	max_iters	failed	237.595	–	–
BOYD1	COSMO.jl	optimal	optimal	485.882	33.0736	5.357×10^{-7}
BOYD1	COSMO.jl unenhanced	unknown	failed	1.32736	–	–
BOYD1	SCS unenhanced	optimal	failed	292.99	2.183×10^{7}	0.353648
EXDATA	Clarabel	optimal	optimal	8.06177	2.018×10^{-7}	1.423×10^{-9}
EXDATA	SCS	optimal	optimal	15.9724	2.981×10^{-5}	2.102×10^{-7}
EXDATA	OSQP	optimal	optimal	17.0005	1.186×10^{-5}	8.363×10^{-8}
EXDATA	CCosmo	optimal	optimal	18.7758	1.449×10^{-5}	1.022×10^{-7}
EXDATA	CCosmo unenhanced	optimal	optimal	18.3675	1.449×10^{-5}	1.022×10^{-7}
EXDATA	COSMO.jl	optimal	optimal	16.1645	8.243×10^{-6}	5.811×10^{-8}
EXDATA	COSMO.jl unenhanced	optimal	optimal	22.0295	1.460×10^{-5}	1.029×10^{-7}
EXDATA	SCS unenhanced	optimal	optimal	19.3613	2.273×10^{-5}	1.602×10^{-7}

APPENDIX D
GCS CONIC BENCHMARK DETAILS

TABLE VI: GCS Conic Benchmark Results.

Instance	Solver	Raw status	Normalized	Iters	Solve time [s]	Objective
Iiwa Collision Avoidance: Order 1, Left Bin to Right Bin	Clarabel	optimal	optimal	15	1.00416	1.79648
Iiwa Collision Avoidance: Order 1, Left Bin to Right Bin	SCS	optimal	optimal	2050	5.87663	1.79634
Iiwa Collision Avoidance: Order 1, Left Bin to Right Bin	COSMO.jl	optimal	optimal	525	3.79901	1.7965
Iiwa Collision Avoidance: Order 1, Left Bin to Right Bin	CCosmo	optimal	optimal	450	1.36039	1.79643
Iiwa Collision Avoidance: Order 2, Left to Shelf to Front Shelf	Clarabel	optimal	optimal	24	3.59999	0.539256
Iiwa Collision Avoidance: Order 2, Left to Shelf to Front Shelf	SCS	optimal	max_iters	10000	102.417	0.525765
Iiwa Collision Avoidance: Order 2, Left to Shelf to Front Shelf	COSMO.jl	optimal	optimal	850	11.7245	0.539293
Iiwa Collision Avoidance: Order 2, Left to Shelf to Front Shelf	CCosmo	optimal	optimal	475	3.01854	0.539082
Iiwa Collision Avoidance: Order 4, Top Rack to Above Shelf	Clarabel	optimal	optimal	36	8.67778	0.873999

Instance	Solver	Raw status	Normalized	Iters	Solve time [s]	Objective
Iiwa Collision Avoidance: Order 4, Top Rack to Above Shelf	SCS	`optimal`	`max_iters`	10000	138.76	0.861348
Iiwa Collision Avoidance: Order 4, Top Rack to Above Shelf	COSMO.jl	`optimal`	`obj_mismatch`	8876	311.364	0.860086
Iiwa Collision Avoidance: Order 4, Top Rack to Above Shelf	CCosmo	`optimal`	`optimal`	5825	123.744	0.872956
Helicopter Nav: 300 islands, seed 45	Clarabel	`optimal`	`optimal`	36	28.4399	11.3234
Helicopter Nav: 300 islands, seed 45	SCS	`optimal`	`obj_mismatch`	6500	203.483	11.2515
Helicopter Nav: 300 islands, seed 45	COSMO.jl	`optimal`	`obj_mismatch`	6550	282.963	0.458636
Helicopter Nav: 300 islands, seed 45	CCosmo	`max_iters`	`max_iters`	10000	194.646	0.477028
Simple Maze: 10x10, seed 28	Clarabel	`optimal`	`optimal`	30	2.02052	31.2007
Simple Maze: 10x10, seed 28	SCS	`optimal`	`obj_mismatch`	2175	6.55543	31.1915
Simple Maze: 10x10, seed 28	COSMO.jl	`optimal`	`obj_mismatch`	7777	37.342	31.1862
Simple Maze: 10x10, seed 28	CCosmo	`optimal`	`obj_mismatch`	6625	33.7026	31.1952
Simple Maze: 15x15, seed 86	Clarabel	`optimal`	`optimal`	25	10.2549	68.8874
Simple Maze: 15x15, seed 86	SCS	`optimal`	`max_iters`	10000	145.925	68.8621
Simple Maze: 15x15, seed 86	COSMO.jl	`max_iters`	`max_iters`	10000	337.666	68.4438
Simple Maze: 15x15, seed 86	CCosmo	`optimal`	`optimal`	6175	40.5684	68.8847
Simple Maze: 5x5, seed 58	Clarabel	`optimal`	`optimal`	12	0.290772	7.97154
Simple Maze: 5x5, seed 58	SCS	`optimal`	`optimal`	325	0.301798	7.97151
Simple Maze: 5x5, seed 58	COSMO.jl	`optimal`	`optimal`	402	1.24448	7.97148
Simple Maze: 5x5, seed 58	CCosmo	`optimal`	`optimal`	225	0.178482	7.97153
Bimanual Manipulation: Instance 66	Clarabel	`optimal`	`optimal`	33	13.7611	5.5968
Bimanual Manipulation: Instance 66	SCS	`optimal`	`max_iters`	10000	109.723	5.58868
Bimanual Manipulation: Instance 66	COSMO.jl	`optimal`	`optimal`	1325	13.4708	5.59372
Bimanual Manipulation: Instance 66	CCosmo	`max_iters`	`max_iters`	10000	67.7093	5.59686
Bimanual Manipulation: Instance 45	Clarabel	`optimal`	`optimal`	36	26.8348	5.6247
Bimanual Manipulation: Instance 45	SCS	`optimal`	`obj_mismatch`	9700	111.514	5.60731
Bimanual Manipulation: Instance 45	COSMO.jl	`optimal`	`optimal`	2425	49.9488	5.62221
Bimanual Manipulation: Instance 45	CCosmo	`optimal`	`optimal`	9650	142.921	5.62374