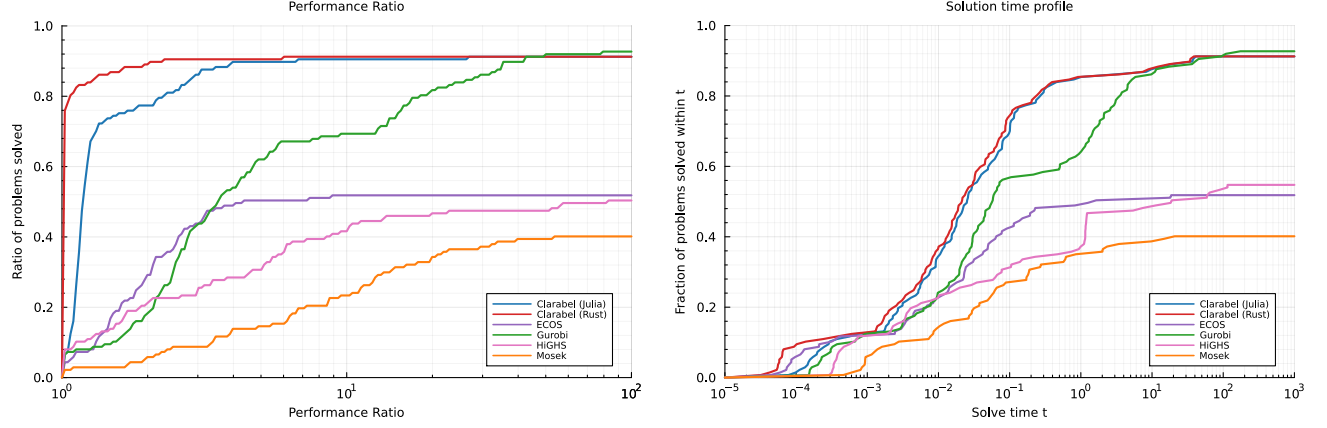


## 5 Numerical Experiments

### 5.1 Benchmark problems with quadratic objectives

#### 5.1.1 The Maros-Meszaros test set

Figure 1: Performance profiles for the Maros-Meszaros problem set



(a) Relative performance profile

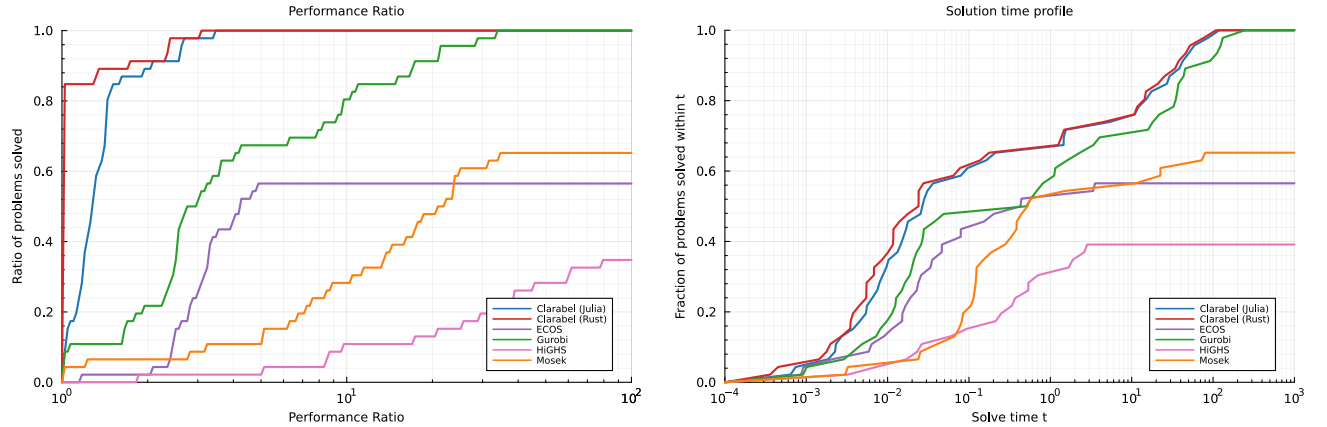
(b) Absolute performance profile

|                  |           | ClarabelRs | Clarabel | ECOS  | Gurobi | HiGHS | Mosek |
|------------------|-----------|------------|----------|-------|--------|-------|-------|
| Shifted GM       | Full Acc. | 1.0        | 1.02     | 15.49 | 1.64   | 17.92 | 32.67 |
|                  | Low Acc.  | 1.0        | 1.1      | 19.8  | 2.9    | 39.99 | 4.07  |
| Failure Rate (%) | Full Acc. | 8.8        | 8.8      | 48.2  | 7.3    | 45.3  | 59.9  |
|                  | Low Acc.  | 2.2        | 2.9      | 38.0  | 3.6    | 45.3  | 10.2  |

(c) Benchmark timings as shifted geometric mean and failure rates

#### 5.1.2 Least-squares problems with SuiteSparse matrices

Figure 2: Performance profiles for the SuiteSparse least-squares problem set



(a) Relative performance profile

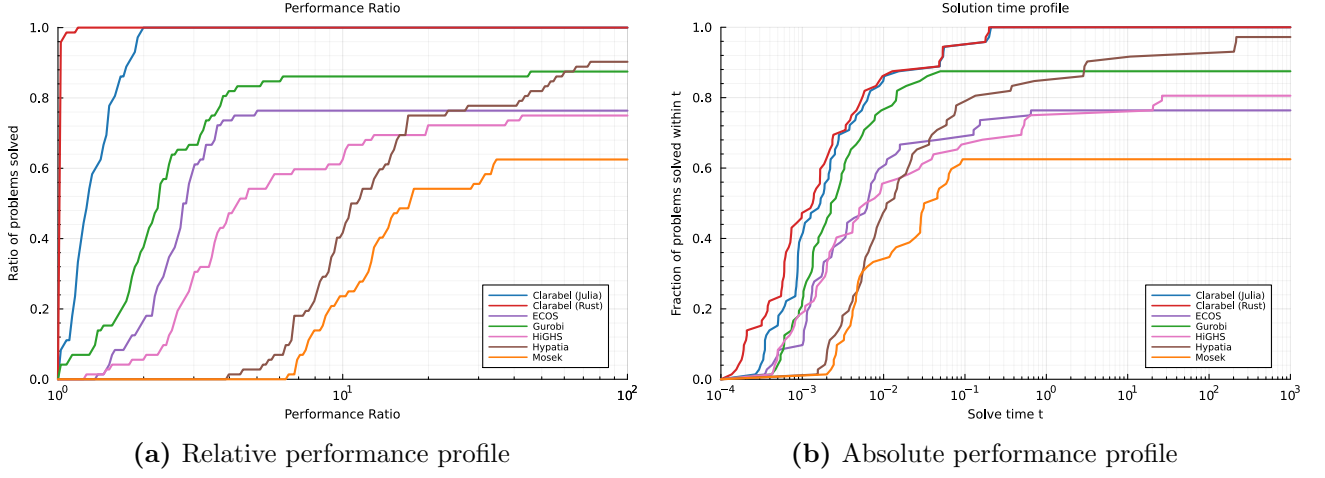
(b) Absolute performance profile

|                  |           | ClarabelRs | Clarabel | ECOS | Gurobi | HiGHS | Mosek |
|------------------|-----------|------------|----------|------|--------|-------|-------|
| Shifted GM       | Full Acc. | 1.0        | 1.06     | 7.12 | 1.79   | 21.5  | 6.31  |
|                  | Low Acc.  | 1.0        | 1.06     | 5.43 | 1.79   | 21.5  | 1.68  |
| Failure Rate (%) | Full Acc. | 0.0        | 0.0      | 43.5 | 0.0    | 60.9  | 34.8  |
|                  | Low Acc.  | 0.0        | 0.0      | 39.1 | 0.0    | 60.9  | 0.0   |

(c) Benchmark timings as shifted geometric mean and failure rates

### 5.1.3 Constrained optimal control

Figure 3: Performance profiles for the optimal control problem set



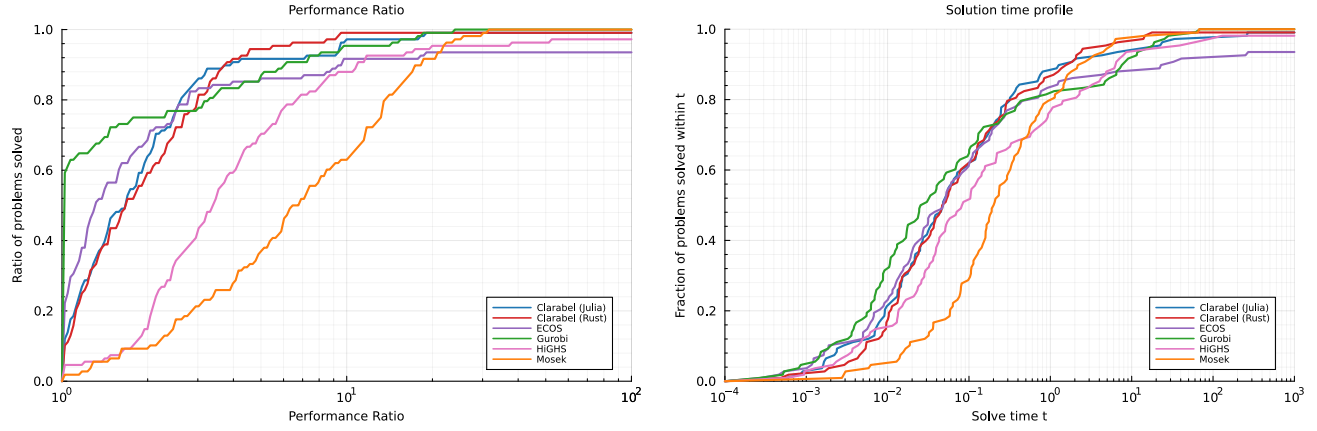
|                  |           | ClarabelRs | Clarabel | ECOS   | Gurobi | HiGHS  | Hypatia | Mosek  |
|------------------|-----------|------------|----------|--------|--------|--------|---------|--------|
| Shifted GM       | Full Acc. | 1.0        | 1.06     | 197.57 | 70.48  | 185.45 | 54.95   | 511.01 |
|                  | Low Acc.  | 1.0        | 1.06     | 14.97  | 60.07  | 185.45 | 37.36   | 8.26   |
| Failure Rate (%) | Full Acc. | 0.0        | 0.0      | 23.6   | 12.5   | 19.4   | 2.8     | 37.5   |
|                  | Low Acc.  | 0.0        | 0.0      | 2.8    | 11.1   | 19.4   | 0.0     | 0.0    |

(c) Benchmark timings as shifted geometric mean and failure rates

## 5.2 Benchmark problems with linear objectives

### 5.2.1 NETLIB LP problems

Figure 4: Performance profiles for the NETLIB Feasible LP problem set



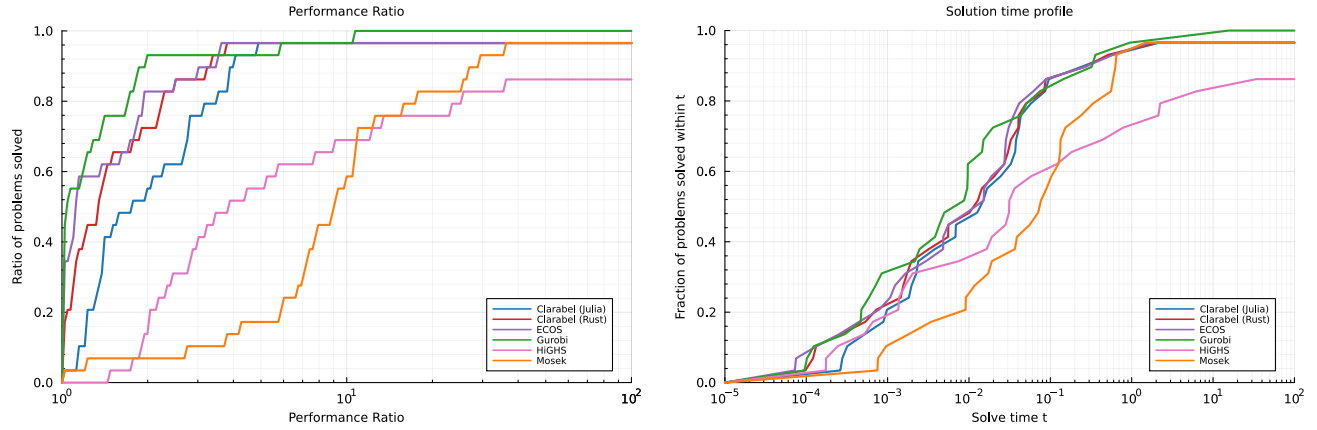
(a) Relative performance profile

(b) Absolute performance profile

|                  |           | ClarabelRs | Clarabel | ECOS | Gurobi | HiGHS | Mosek |
|------------------|-----------|------------|----------|------|--------|-------|-------|
| Shifted GM       | Full Acc. | 1.0        | 1.35     | 2.76 | 1.69   | 2.32  | 1.55  |
|                  | Low Acc.  | 1.0        | 1.35     | 1.41 | 1.69   | 2.32  | 1.55  |
| Failure Rate (%) | Full Acc. | 0.9        | 0.9      | 6.5  | 0.0    | 1.9   | 0.0   |
|                  | Low Acc.  | 0.9        | 0.9      | 0.9  | 0.0    | 1.9   | 0.0   |

(c) Benchmark timings as shifted geometric mean and failure rates

Figure 5: Performance profiles for the NETLIB Infeasible LP problem set



(a) Relative performance profile

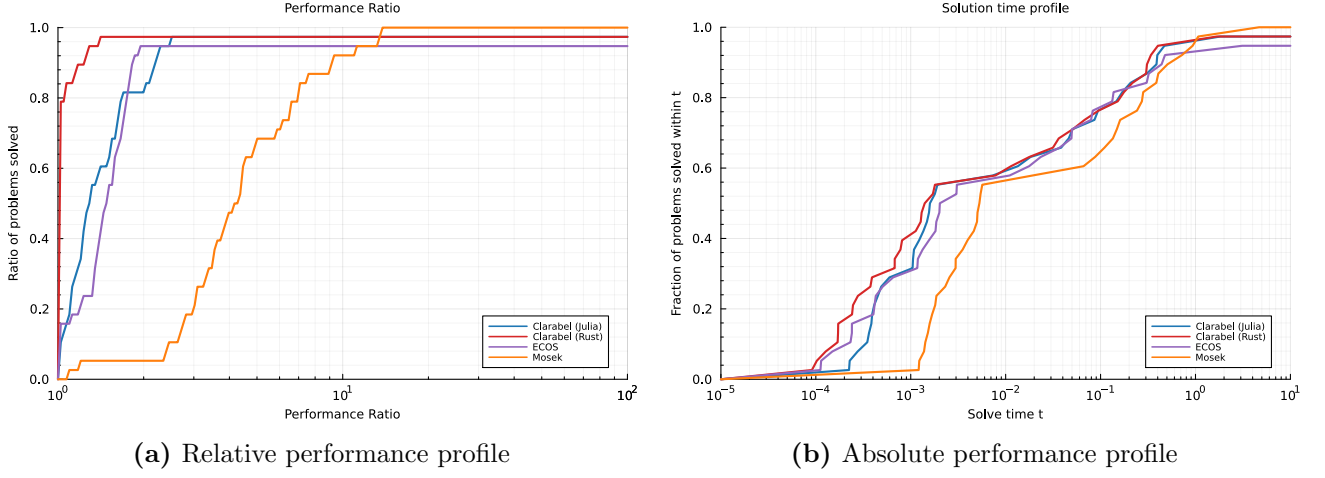
(b) Absolute performance profile

|                  |           | ClarabelRs | Clarabel | ECOS | Gurobi | HiGHS | Mosek |
|------------------|-----------|------------|----------|------|--------|-------|-------|
| Shifted GM       | Full Acc. | 1.89       | 1.92     | 1.85 | 1.0    | 12.19 | 2.49  |
|                  | Low Acc.  | 1.89       | 1.92     | 1.85 | 1.0    | 12.19 | 2.49  |
| Failure Rate (%) | Full Acc. | 3.4        | 3.4      | 3.4  | 0.0    | 13.8  | 3.4   |
|                  | Low Acc.  | 3.4        | 3.4      | 3.4  | 0.0    | 13.8  | 3.4   |

(c) Benchmark timings as shifted geometric mean and failure rates

### 5.2.2 CBLIB exponential cone problems

Figure 6: Performance profiles for the CBLIB Exponential Cone problem set

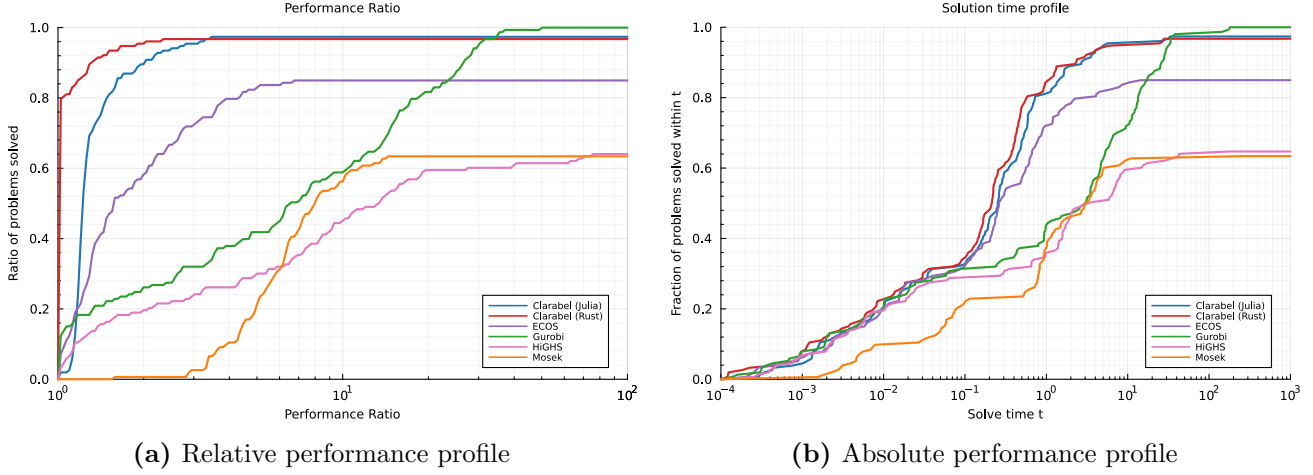


|                  |           | ClarabelRs | Clarabel | ECOS | Mosek |
|------------------|-----------|------------|----------|------|-------|
| Shifted GM       | Full Acc. | 1.45       | 1.49     | 2.68 | 1.0   |
|                  | Low Acc.  | 1.0        | 1.08     | 3.28 | 2.14  |
| Failure Rate (%) | Full Acc. | 2.6        | 2.6      | 5.3  | 0.0   |
|                  | Low Acc.  | 0.0        | 0.0      | 2.6  | 0.0   |

(c) Benchmark timings as shifted geometric mean and failure rates

### 5.2.3 Optimal power flow

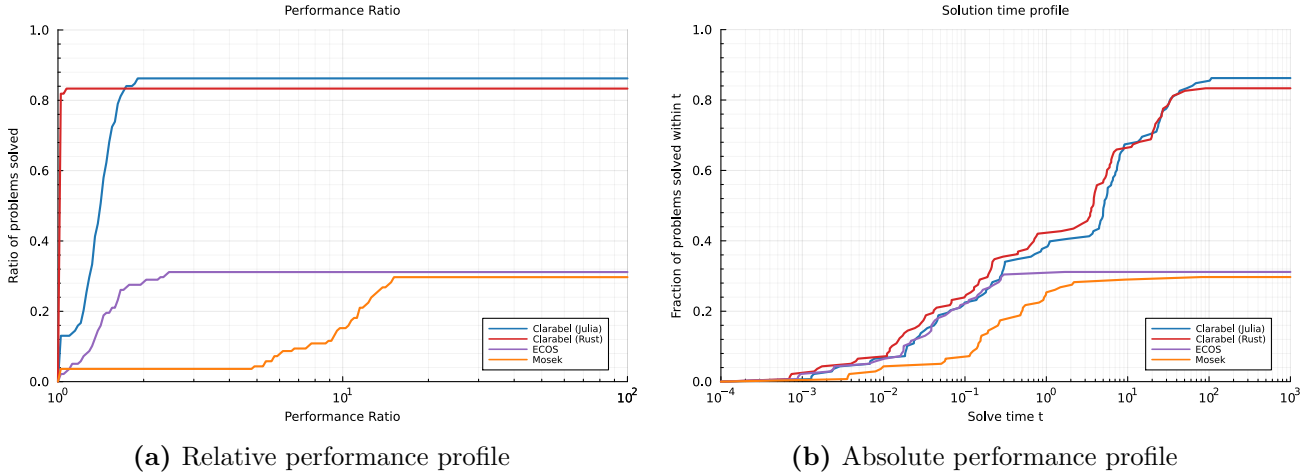
Figure 7: Performance profiles for the LP Optimal Power Flow problem set



|                  |           | ClarabelRs | Clarabel | ECOS | Gurobi | HiGHS | Mosek |
|------------------|-----------|------------|----------|------|--------|-------|-------|
| Shifted GM       | Full Acc. | 1.0        | 1.04     | 3.27 | 4.48   | 17.73 | 17.58 |
|                  | Low Acc.  | 1.0        | 1.07     | 2.89 | 5.57   | 22.04 | 21.85 |
| Failure Rate (%) | Full Acc. | 3.3        | 2.6      | 15.0 | 0.0    | 35.3  | 36.6  |
|                  | Low Acc.  | 1.3        | 0.7      | 9.8  | 0.0    | 35.3  | 36.6  |

(c) Benchmark timings as shifted geometric mean and failure rates

Figure 8: Performance profiles for the SOCP Optimal Power Flow problem set

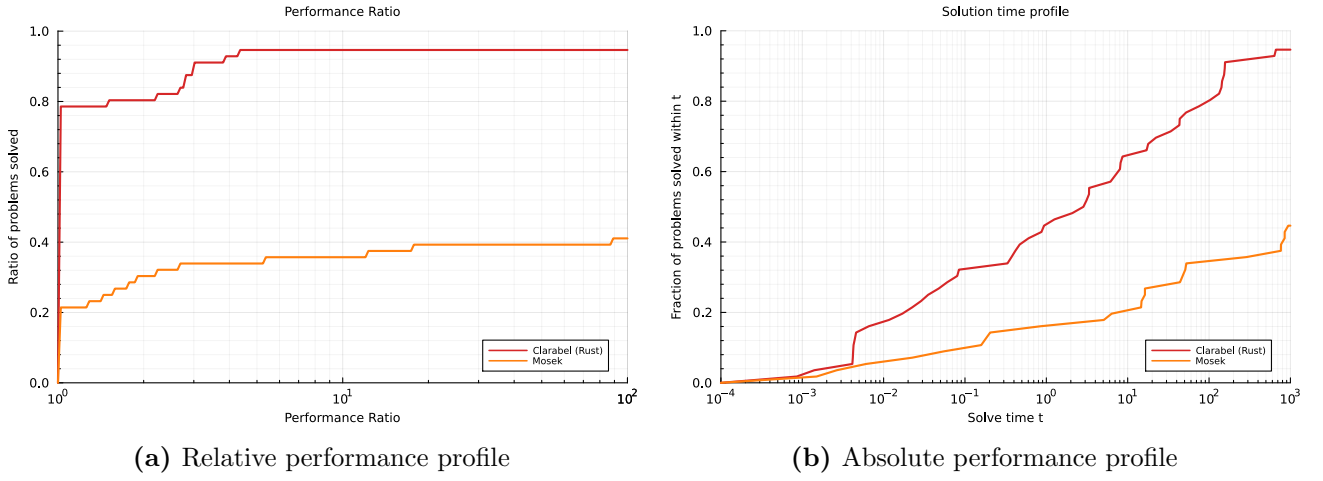


|                  |           | ClarabelRs | Clarabel | ECOS | Mosek |
|------------------|-----------|------------|----------|------|-------|
| Shifted GM       | Full Acc. | 1.0        | 1.07     | 8.25 | 10.02 |
|                  | Low Acc.  | 1.0        | 1.33     | 8.62 | 20.48 |
| Failure Rate (%) | Full Acc. | 16.7       | 13.8     | 68.8 | 70.3  |
|                  | Low Acc.  | 0.7        | 2.2      | 55.8 | 70.3  |

(c) Benchmark timings as shifted geometric mean and failure rates

### 5.3 Semidefinite program benchmarks

**Figure 9: Performance profiles for the SDPLIB Semidefinite Programming problem set**



|                  |           | ClarabelRs | Mosek |
|------------------|-----------|------------|-------|
| Shifted GM       | Full Acc. | 1.0        | 11.47 |
|                  | Low Acc.  | 1.0        | 1.27  |
| Failure Rate (%) | Full Acc. | 5.4        | 55.4  |
|                  | Low Acc.  | 1.8        | 1.8   |

(c) Benchmark timings as shifted geometric mean and failure rates

## A Detailed benchmark results

Table 1: Solve times and iteration counts for the Maros-Mezzaros problem set

| Problem  | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |          | total time (s) |          |          |
|----------|-------|-------|--------|--------|------------|------|-------|-----------------------|----------|----------|----------------|----------|----------|
|          |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek    | ClarabelRs     | ECOS     | Mosek    |
| TAME     | 3     | 2     | 4      | 3      | 5          | 6    | 3     | 1.16e-05              | 7.36e-06 | 0.000154 | 5.81e-05       | 4.41e-05 | 0.000461 |
| HS21     | 5     | 2     | 6      | 2      | 9          | 11   | 11    | 6.19e-06              | 6.63e-06 | 0.000105 | 5.57e-05       | 7.29e-05 | 0.00115  |
| HS35     | 4     | 3     | 6      | 5      | 7          | 9    | 9     | 7.64e-06              | 9.51e-06 | 0.000105 | 5.35e-05       | 8.56e-05 | 0.000944 |
| HS35MOD  | 4     | 3     | 6      | 5      | 12         | 15   | 14    | 5.37e-06              | 7.67e-06 | 9.91e-05 | 6.45e-05       | 0.000115 | 0.00139  |
| QPTTEST  | 5     | 2     | 7      | 3      | 8          | 9    | 8     | 8.01e-06              | 9.51e-06 | 0.000158 | 6.41e-05       | 8.56e-05 | 0.00126  |
| HS51     | 3     | 5     | 7      | 7      | 0          | 9    | 9     | 0                     | 8.83e-06 | 0.000104 | 3.2e-05        | 7.95e-05 | 0.000934 |
| HS52     | 3     | 5     | 7      | 7      | 0          | 7    | 5     | 0                     | 1.06e-05 | 0.000121 | 5.51e-05       | 7.43e-05 | 0.000607 |
| ZECEVIC2 | 6     | 2     | 8      | 1      | 8          | 8    | 7     | 8.3e-06               | 7.49e-06 | 0.000115 | 6.64e-05       | 6e-05    | 0.000806 |
| HS268    | 5     | 5     | 25     | 15     | 12         | 17   | -     | 7.78e-06              | 1.24e-05 | -        | 9.33e-05       | 0.000211 | -        |
| S268     | 5     | 5     | 25     | 15     | 12         | 17   | -     | 8.49e-06              | 1.23e-05 | -        | 0.000102       | 0.00021  | -        |
| HS76     | 7     | 4     | 14     | 6      | 6          | 9    | 8     | 1.05e-05              | 1.08e-05 | 0.000115 | 6.31e-05       | 9.69e-05 | 0.000919 |
| GENHS28  | 8     | 10    | 24     | 19     | 0          | 10   | 6     | 0                     | 1.3e-05  | 0.00014  | 4.27e-05       | 0.00013  | 0.000842 |
| HS53     | 13    | 5     | 17     | 7      | 6          | 15   | 7     | 9.67e-06              | 8.26e-06 | 0.000133 | 5.8e-05        | 0.000124 | 0.00093  |
| LOTSCHD  | 19    | 12    | 66     | 6      | 9          | 19   | 19    | 1.52e-05              | 1.9e-05  | 0.000382 | 0.000137       | 0.000361 | 0.00727  |
| HS118    | 59    | 15    | 93     | 15     | 11         | 10   | 12    | 2.19e-05              | 3.16e-05 | 0.000134 | 0.000241       | 0.000316 | 0.00161  |
| QAFIRO   | 59    | 32    | 115    | 6      | 14         | 14   | 13    | 2.68e-05              | 2.9e-05  | 0.000185 | 0.000376       | 0.000407 | 0.00241  |
| DPKLO1   | 77    | 133   | 1575   | 77     | 0          | 14   | 6     | 0                     | 0.000317 | 0.00143  | 0.000602       | 0.00443  | 0.00856  |
| DUAL4    | 151   | 75    | 225    | 2799   | 12         | 12   | 14    | 0.000287              | 0.000391 | 0.000601 | 0.00345        | 0.0047   | 0.00842  |
| QPCBLEND | 157   | 83    | 574    | 83     | 17         | 18   | 15    | 0.0001                | 0.000137 | 0.000983 | 0.00171        | 0.00246  | 0.0148   |
| DUALC1   | 233   | 9     | 1953   | 45     | 12         | 24   | -     | 0.000147              | 0.00014  | -        | 0.00176        | 0.00336  | -        |
| DUALC2   | 243   | 7     | 1617   | 28     | 11         | -    | -     | 0.000122              | -        | -        | 0.00134        | -        | -        |
| QADLITTL | 153   | 97    | 480    | 87     | 14         | 27   | -     | 9.36e-05              | 9.02e-05 | -        | 0.00131        | 0.00244  | -        |
| QSHARE2B | 175   | 79    | 773    | 55     | 16         | 27   | -     | 0.000125              | 0.000144 | -        | 0.002          | 0.00389  | -        |
| DUAL1    | 171   | 85    | 255    | 3558   | 12         | 15   | 11    | 0.000374              | 0.00044  | 0.0007   | 0.00448        | 0.0066   | 0.0077   |
| DUAL2    | 193   | 96    | 288    | 4508   | 11         | 15   | 13    | 0.000489              | 0.000576 | 0.000796 | 0.00538        | 0.00864  | 0.0104   |
| DUALC5   | 294   | 8     | 2240   | 36     | 10         | 17   | 15    | 0.000165              | 0.000206 | 0.000185 | 0.00165        | 0.00351  | 0.00278  |
| CVXQP2.S | 225   | 100   | 274    | 386    | 10         | -    | -     | 0.000138              | -        | -        | 0.00138        | -        | -        |
| DUAL3    | 223   | 111   | 333    | 6108   | 12         | 19   | 12    | 0.000673              | 0.000836 | 0.00224  | 0.00808        | 0.0159   | 0.0269   |
| CVXQP1.S | 250   | 100   | 348    | 386    | 9          | -    | -     | 0.000175              | -        | -        | 0.00157        | -        | -        |
| CVXQP3.S | 275   | 100   | 422    | 386    | 11         | -    | -     | 0.000204              | -        | -        | 0.00224        | -        | -        |
| QSCAGR7  | 269   | 140   | 560    | 25     | 16         | -    | -     | 0.000121              | -        | -        | 0.00194        | -        | -        |
| PRIMAL1  | 86    | 325   | 5816   | 324    | 10         | 20   | 10    | 0.000912              | 0.000898 | 0.00297  | 0.00912        | 0.018    | 0.0297   |
| QRECIPE  | 340   | 180   | 912    | 50     | 17         | 21   | 23    | 0.00015               | 0.000151 | 0.00137  | 0.00256        | 0.00318  | 0.0316   |
| QPCBOE12 | 382   | 143   | 1480   | 143    | 20         | -    | -     | 0.000328              | -        | -        | 0.00657        | -        | -        |
| DUALC8   | 519   | 8     | 4040   | 36     | 9          | -    | -     | 0.000304              | -        | -        | 0.00273        | -        | -        |
| QSHARE1B | 342   | 225   | 1376   | 39     | 32         | -    | 32    | 0.000203              | -        | 0.00174  | 0.0065         | -        | 0.0557   |
| PRIMALC5 | 286   | 287   | 2574   | 286    | 14         | 14   | 14    | 0.000234              | 0.000319 | 0.00268  | 0.00328        | 0.00446  | 0.0376   |
| VALUES   | 405   | 202   | 606    | 3822   | 13         | -    | -     | 0.000376              | -        | -        | 0.00489        | -        | -        |
| QSC205   | 408   | 203   | 754    | 21     | 19         | 18   | 18    | 0.000161              | 0.000166 | 0.000662 | 0.00307        | 0.00299  | 0.0119   |
| QBEACONF | 435   | 262   | 3637   | 27     | 28         | 28   | 21    | 0.000496              | 0.000505 | 0.00179  | 0.0139         | 0.0141   | 0.0375   |
| QBRANDY  | 469   | 249   | 2397   | 65     | 19         | 32   | -     | 0.000466              | 0.000412 | -        | 0.00884        | 0.0132   | -        |
| PRIMAL2  | 97    | 649   | 8043   | 648    | 8          | 16   | 8     | 0.00146               | 0.00148  | 0.00332  | 0.0117         | 0.0237   | 0.0265   |
| QE226    | 505   | 282   | 2860   | 964    | 24         | 26   | 22    | 0.000645              | 0.000874 | 0.00271  | 0.0155         | 0.0227   | 0.0596   |
| PRIMAL3  | 112   | 745   | 21548  | 744    | 9          | 18   | 10    | 0.004                 | 0.00308  | 0.00622  | 0.036          | 0.0554   | 0.0622   |
| QBORE3D  | 559   | 315   | 1755   | 78     | 27         | 25   | 21    | 0.000372              | 0.000388 | 0.00249  | 0.01           | 0.00969  | 0.0523   |
| KSIP     | 1001  | 20    | 19898  | 20     | 14         | 20   | 12    | 0.00135               | 0.00121  | 0.000778 | 0.0189         | 0.0242   | 0.00934  |



Table 1: Solve times and iteration counts for the Maros-Mezzaros problem set

| Problem  | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |         | total time (s) |         |        |
|----------|-------|-------|--------|--------|------------|------|-------|-----------------------|----------|---------|----------------|---------|--------|
|          |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek   | ClarabelRs     | ECOS    | Mosek  |
| QGROW7   | 721   | 301   | 3193   | 357    | 22         | 22   | -     | 0.000566              | 0.00063  | -       | 0.0125         | 0.0139  | -      |
| QFORPLAN | 604   | 421   | 5006   | 582    | 21         | -    | -     | 0.000817              | -        | -       | 0.0172         | -       | -      |
| PRIMALC8 | 511   | 520   | 4663   | 519    | 12         | -    | -     | 0.000574              | -        | -       | 0.00689        | -       | -      |
| QCAPRI   | 741   | 353   | 2237   | 894    | 32         | -    | -     | 0.000672              | -        | -       | 0.0215         | -       | -      |
| QSCORPIO | 746   | 358   | 1784   | 40     | 11         | 15   | 16    | 0.000353              | 0.00046  | 0.00305 | 0.00388        | 0.0069  | 0.0487 |
| QSCFXM1  | 787   | 457   | 3046   | 733    | 26         | -    | -     | 0.00072               | -        | -       | 0.0187         | -       | -      |
| QBANDM   | 777   | 472   | 2966   | 41     | 21         | 37   | -     | 0.000602              | 0.000618 | -       | 0.0126         | 0.0229  | -      |
| QSCTAP1  | 780   | 480   | 2172   | 153    | 19         | 24   | 24    | 0.000405              | 0.000469 | 0.00274 | 0.0077         | 0.0113  | 0.0659 |
| QPCSTAIR | 823   | 467   | 4323   | 467    | 22         | -    | -     | 0.000988              | -        | -       | 0.0217         | -       | -      |
| QSTAIR   | 823   | 467   | 4323   | 1018   | 31         | -    | -     | 0.00124               | -        | -       | 0.0386         | -       | -      |
| QPCBOEI1 | 980   | 384   | 4359   | 384    | 17         | 42   | -     | 0.000906              | 0.00102  | -       | 0.0154         | 0.0429  | -      |
| QSCAGR25 | 971   | 500   | 2054   | 128    | 20         | -    | -     | 0.000395              | -        | -       | 0.0079         | -       | -      |
| PRIMAL4  | 76    | 1489  | 16032  | 1488   | 10         | 21   | 13    | 0.00304               | 0.00309  | 0.0063  | 0.0304         | 0.065   | 0.0819 |
| QSCSD1   | 837   | 760   | 3148   | 745    | 10         | 12   | 12    | 0.0006                | 0.000702 | 0.00244 | 0.006          | 0.00843 | 0.0293 |
| QETAMACR | 1223  | 688   | 3232   | 4447   | 20         | 33   | -     | 0.00467               | 0.00458  | -       | 0.0934         | 0.151   | -      |
| QGROW15  | 1545  | 645   | 6865   | 500    | 22         | 22   | -     | 0.00115               | 0.00121  | -       | 0.0253         | 0.0266  | -      |
| QFFFFF80 | 1378  | 854   | 7081   | 1916   | 27         | 52   | -     | 0.00247               | 0.00263  | -       | 0.0668         | 0.137   | -      |
| MOSARQP2 | 1500  | 900   | 3830   | 945    | 10         | 22   | 18    | 0.00143               | 0.00189  | 0.0101  | 0.0143         | 0.0416  | 0.181  |
| GOULDQP2 | 1747  | 699   | 2445   | 697    | 14         | -    | -     | 0.000596              | -        | -       | 0.00835        | -       | -      |
| GOULDQP3 | 1747  | 699   | 2445   | 1395   | 7          | -    | -     | 0.00067               | -        | -       | 0.00469        | -       | -      |
| QSCFXM2  | 1574  | 914   | 6097   | 1131   | 32         | -    | -     | 0.00143               | -        | -       | 0.0458         | -       | -      |
| QSTANDAT | 1538  | 1075  | 4210   | 804    | 18         | 28   | 20    | 0.000859              | 0.000826 | 0.00856 | 0.0155         | 0.0231  | 0.171  |
| QSCRS8   | 1659  | 1169  | 4351   | 121    | 33         | 30   | 31    | 0.000978              | 0.00102  | 0.0061  | 0.0323         | 0.0305  | 0.189  |
| QSCSD6   | 1497  | 1350  | 5666   | 1404   | 13         | 17   | 19    | 0.00102               | 0.00129  | 0.00465 | 0.0133         | 0.0219  | 0.0884 |
| LASER    | 2000  | 1002  | 6000   | 3231   | 11         | 28   | -     | 0.000896              | 0.0013   | -       | 0.00985        | 0.0363  | -      |
| QGFRDXPN | 1966  | 1092  | 3727   | 162    | 22         | -    | -     | 0.000811              | -        | -       | 0.0178         | -       | -      |
| QSEBA    | 2057  | 1028  | 5902   | 646    | 30         | -    | -     | 0.00107               | -        | -       | 0.032          | -       | -      |
| QGROW22  | 2266  | 946   | 10078  | 852    | 27         | 30   | -     | 0.00167               | 0.00168  | -       | 0.0451         | 0.0503  | -      |
| CVXQP2_M | 2250  | 1000  | 2749   | 3984   | 10         | -    | -     | 0.00502               | -        | -       | 0.0502         | -       | -      |
| QSHIP04S | 1860  | 1458  | 5810   | 56     | 15         | 35   | -     | 0.00101               | 0.000906 | -       | 0.0151         | 0.0317  | -      |
| CVXQP1_M | 2500  | 1000  | 3498   | 3984   | 10         | -    | -     | 0.0077                | -        | -       | 0.077          | -       | -      |
| QSCFXM3  | 2361  | 1371  | 9148   | 1221   | 34         | -    | -     | 0.00202               | -        | -       | 0.0688         | -       | -      |
| CVXQP3_M | 2750  | 1000  | 4247   | 3984   | 12         | -    | -     | 0.00892               | -        | -       | 0.107          | -       | -      |
| Q25FV47  | 2391  | 1571  | 11971  | 59499  | 26         | -    | -     | 0.0135                | -        | -       | 0.351          | -       | -      |
| QSHELL   | 2428  | 1775  | 5448   | 34790  | 35         | -    | -     | 0.00698               | -        | -       | 0.244          | -       | -      |
| QSHIP04L | 2520  | 2118  | 8450   | 56     | 15         | 39   | -     | 0.0014                | 0.00126  | -       | 0.021          | 0.049   | -      |
| QSCTAP2  | 2970  | 1880  | 8594   | 777    | 12         | 20   | 15    | 0.00202               | 0.00247  | 0.0115  | 0.0242         | 0.0495  | 0.172  |
| AUG3D    | 1000  | 3873  | 6546   | 2673   | 0          | -    | 10    | 0                     | -        | 0.0186  | 0.00577        | -       | 0.186  |
| AUG3DC   | 1000  | 3873  | 6546   | 3873   | 0          | -    | -     | 0                     | -        | -       | 0.00582        | -       | -      |
| QSHIP08S | 3165  | 2387  | 9501   | 11677  | 15         | 36   | -     | 0.00398               | 0.00535  | -       | 0.0598         | 0.193   | -      |
| QPILOTNO | 3487  | 2172  | 15569  | 485    | 31         | -    | -     | 0.00652               | -        | -       | 0.202          | -       | -      |
| MOSARQP1 | 3200  | 2500  | 5922   | 2545   | 10         | 23   | 19    | 0.00192               | 0.00334  | 0.0325  | 0.0192         | 0.0769  | 0.618  |
| QSCSD8   | 3147  | 2750  | 11334  | 2510   | 11         | 18   | 17    | 0.00213               | 0.00348  | 0.0158  | 0.0235         | 0.0627  | 0.269  |
| QSCTAP3  | 3960  | 2480  | 11354  | 1047   | 12         | 22   | -     | 0.00255               | 0.00355  | -       | 0.0306         | 0.078   | -      |
| QSHIP12S | 3914  | 2763  | 10941  | 17403  | 15         | 39   | -     | 0.00434               | 0.0057   | -       | 0.0652         | 0.222   | -      |
| QSIERRA  | 5279  | 2036  | 11354  | 183    | 35         | 51   | -     | 0.00203               | 0.00224  | -       | 0.0709         | 0.114   | -      |

Table 1: Solve times and iteration counts for the Maros-Mezzaros problem set

| Problem  | vars.  | cons. | nnz(A) | nnz(P)  | iterations |      |       | time per iteration(s) |         |        | total time (s) |        |       |
|----------|--------|-------|--------|---------|------------|------|-------|-----------------------|---------|--------|----------------|--------|-------|
|          |        |       |        |         | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS    | Mosek  | ClarabelRs     | ECOS   | Mosek |
| STADAT1  | 5999   | 2001  | 13997  | 2000    | 15         | -    | -     | 0.00176               | -       | -      | 0.0265         | -      | -     |
| STADAT2  | 5999   | 2001  | 13997  | 2000    | 45         | 22   | 23    | 0.00193               | 0.0052  | 0.0119 | 0.0867         | 0.114  | 0.275 |
| AUG3DCQP | 4873   | 3873  | 10419  | 3873    | 11         | 29   | -     | 0.00407               | 0.00668 | -      | 0.0448         | 0.194  | -     |
| AUG3DQP  | 4873   | 3873  | 10419  | 2673    | 13         | -    | -     | 0.0039                | -       | -      | 0.0507         | -      | -     |
| QSHIP08L | 5061   | 4283  | 17085  | 34965   | 16         | 36   | -     | 0.0165                | 0.0229  | -      | 0.264          | 0.826  | -     |
| CONT-050 | 7595   | 2597  | 17199  | 2597    | 9          | 21   | 20    | 0.00992               | 0.0109  | 0.0425 | 0.0893         | 0.229  | 0.85  |
| EXDATA   | 7501   | 3000  | 12000  | 1125750 | 22         | 21   | 16    | 0.548                 | 0.859   | 0.127  | 12             | 18     | 2.03  |
| QSHIP12L | 6578   | 5427  | 21597  | 62228   | 16         | 36   | -     | 0.0246                | 0.0348  | -      | 0.394          | 1.25   | -     |
| STCQP1   | 10246  | 4097  | 21532  | 26603   | 7          | -    | -     | 0.0127                | -       | -      | 0.0892         | -      | -     |
| STCQP2   | 10246  | 4097  | 21532  | 26603   | 9          | -    | -     | 0.0248                | -       | -      | 0.223          | -      | -     |
| STADAT3  | 11999  | 4001  | 27997  | 4000    | 54         | 18   | 24    | 0.00379               | 0.00507 | 0.0237 | 0.205          | 0.0912 | 0.569 |
| HUES-MOD | 10002  | 10000 | 30000  | 10000   | 13         | -    | -     | 0.00595               | -       | -      | 0.0774         | -      | -     |
| HUESTIS  | 10002  | 10000 | 30000  | 10000   | 9          | -    | -     | 0.0111                | -       | -      | 0.1            | -      | -     |
| LISWET2  | 10000  | 10002 | 30000  | 10002   | 18         | -    | -     | 0.00483               | -       | -      | 0.0869         | -      | -     |
| LISWET3  | 10000  | 10002 | 30000  | 10002   | 23         | -    | -     | 0.00474               | -       | -      | 0.109          | -      | -     |
| LISWET4  | 10000  | 10002 | 30000  | 10002   | 27         | -    | -     | 0.00452               | -       | -      | 0.122          | -      | -     |
| LISWET5  | 10000  | 10002 | 30000  | 10002   | 11         | -    | -     | 0.0055                | -       | -      | 0.0605         | -      | -     |
| LISWET6  | 10000  | 10002 | 30000  | 10002   | 18         | -    | -     | 0.00485               | -       | -      | 0.0873         | -      | -     |
| DTOC3    | 10000  | 14999 | 34995  | 14997   | 0          | -    | 9     | 0                     | -       | 0.067  | 0.0168         | -      | 0.603 |
| AUG2D    | 10000  | 20200 | 40000  | 19800   | 0          | -    | -     | 0                     | -       | -      | 0.0327         | -      | -     |
| AUG2DC   | 10000  | 20200 | 40000  | 20200   | 0          | -    | -     | 0                     | -       | -      | 0.0334         | -      | -     |
| CVXQP2.L | 22500  | 10000 | 27499  | 39984   | 10         | -    | -     | 1.77                  | -       | -      | 17.7           | -      | -     |
| CVXQP1.L | 25000  | 10000 | 34998  | 39984   | 11         | -    | -     | 3.14                  | -       | -      | 34.5           | -      | -     |
| CVXQP3.L | 27500  | 10000 | 42497  | 39984   | 11         | -    | -     | 3.52                  | -       | -      | 38.8           | -      | -     |
| CONT-100 | 30195  | 10197 | 69399  | 10197   | 9          | 19   | 14    | 0.076                 | 0.0866  | 0.167  | 0.684          | 1.64   | 2.34  |
| CONT-101 | 30492  | 10197 | 69993  | 2700    | 12         | -    | 14    | 0.0761                | -       | 0.143  | 0.913          | -      | 2.01  |
| UBH1     | 24018  | 18009 | 60018  | 6003    | 16         | -    | 35    | 0.00949               | -       | 0.0979 | 0.152          | -      | 3.43  |
| AUG2DCQP | 30200  | 20200 | 60200  | 20200   | 12         | -    | -     | 0.0236                | -       | -      | 0.283          | -      | -     |
| AUG2DQP  | 30200  | 20200 | 60200  | 19800   | 14         | -    | -     | 0.0231                | -       | -      | 0.324          | -      | -     |
| CONT-200 | 120395 | 40397 | 278799 | 40397   | 13         | 25   | 16    | 0.572                 | 0.744   | 0.918  | 7.43           | 18.6   | 14.7  |
| CONT-201 | 120992 | 40397 | 279993 | 10400   | 12         | -    | 16    | 0.743                 | -       | 0.608  | 8.92           | -      | 9.73  |
| BOYD1    | 93279  | 93261 | 652246 | 93261   | 35         | -    | -     | 0.0996                | -       | -      | 3.49           | -      | -     |
| CONT-300 | 271492 | 90597 | 629993 | 23100   | 12         | -    | 13    | 2.86                  | -       | 1.6    | 34.4           | -      | 20.8  |

Table 2: Solve times and iteration counts for the Optimal Control problem set

| Problem                    | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |          | total time (s) |          |         |
|----------------------------|-------|-------|--------|--------|------------|------|-------|-----------------------|----------|----------|----------------|----------|---------|
|                            |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek    | ClarabelRs     | ECOS     | Mosek   |
| PENDULUM_3                 | 28    | 23    | 83     | 23     | 5          | 11   | 11    | 2.71e-05              | 3.17e-05 | 0.000182 | 0.000136       | 0.000349 | 0.002   |
| FIORDOSEXAMPLE_1           | 32    | 27    | 67     | 18     | 8          | 12   | 12    | 1.93e-05              | 3.05e-05 | 0.000188 | 0.000155       | 0.000367 | 0.00226 |
| FIORDOSEXAMPLE_3           | 32    | 27    | 67     | 18     | 8          | -    | -     | 2.07e-05              | -        | -        | 0.000166       | -        | -       |
| FORCESEXAMPLE_1            | 38    | 29    | 83     | 28     | 9          | 14   | 11    | 2.07e-05              | 3.59e-05 | 0.000235 | 0.000186       | 0.000502 | 0.00258 |
| FORCESEXAMPLE_2            | 38    | 29    | 83     | 27     | 8          | 13   | 10    | 2.38e-05              | 3.57e-05 | 0.000244 | 0.00019        | 0.000464 | 0.00244 |
| FORCESEXAMPLE_3            | 42    | 32    | 92     | 31     | 9          | 12   | 11    | 2.32e-05              | 4.21e-05 | 0.00024  | 0.000209       | 0.000506 | 0.00264 |
| TOYEXAMPLE_1               | 42    | 32    | 102    | 31     | 7          | -    | 16    | 2.57e-05              | -        | 0.000318 | 0.00018        | -        | 0.00509 |
| TOYEXAMPLE_3               | 42    | 32    | 102    | 31     | 9          | -    | -     | 2.31e-05              | -        | -        | 0.000208       | -        | -       |
| HELICOPTER_1               | 48    | 30    | 96     | 39     | 6          | -    | 21    | 3.39e-05              | -        | 0.000298 | 0.000204       | -        | 0.00626 |
| FIORDOSEXAMPLE_2           | 52    | 27    | 87     | 18     | 7          | 13   | 13    | 2.74e-05              | 3.3e-05  | 0.000188 | 0.000192       | 0.000428 | 0.00244 |
| NONLINEARCSTR_3            | 64    | 54    | 204    | 30     | 10         | -    | 12    | 3.94e-05              | -        | 0.000294 | 0.000394       | -        | 0.00353 |
| ROBOTARM_1                 | 84    | 54    | 174    | 34     | 6          | -    | 27    | 6.23e-05              | -        | 0.000468 | 0.000374       | -        | 0.0126  |
| PENDULUM_1                 | 78    | 63    | 243    | 63     | 6          | 12   | 6     | 5.89e-05              | 8.41e-05 | 0.000444 | 0.000353       | 0.00101  | 0.00266 |
| PENDULUM_2                 | 78    | 63    | 243    | 60     | 7          | 14   | 8     | 5.38e-05              | 7.82e-05 | 0.000406 | 0.000377       | 0.0011   | 0.00325 |
| FORCESEXAMPLE_4            | 82    | 62    | 182    | 61     | 7          | 15   | 7     | 4.53e-05              | 6.95e-05 | 0.000468 | 0.000317       | 0.00104  | 0.00327 |
| TOYEXAMPLE_2               | 82    | 62    | 202    | 61     | 7          | 18   | 10    | 4.54e-05              | 6.3e-05  | 0.000476 | 0.000318       | 0.00113  | 0.00476 |
| AIRCRAFT_3                 | 104   | 84    | 364    | 20     | 8          | 16   | 12    | 7.14e-05              | 0.000113 | 0.000326 | 0.000571       | 0.0018   | 0.00391 |
| DOUBLEINVERTEDPENDULUM_1   | 104   | 84    | 364    | 50     | 7          | 14   | 9     | 8.58e-05              | 0.0001   | 0.00051  | 0.000601       | 0.0014   | 0.00459 |
| DOUBLEINVERTEDPENDULUM_2   | 104   | 84    | 364    | 50     | 8          | 15   | 10    | 8.92e-05              | 8.65e-05 | 0.000457 | 0.000714       | 0.0013   | 0.00457 |
| HELICOPTER_3               | 118   | 86    | 278    | 80     | 7          | 22   | -     | 8.09e-05              | 8.37e-05 | -        | 0.000567       | 0.00184  | -       |
| AIRCRAFT_1                 | 144   | 84    | 404    | 20     | 9          | 10   | 9     | 6.6e-05               | 0.000115 | 0.000462 | 0.000594       | 0.00115  | 0.00416 |
| AIRCRAFT_2                 | 144   | 84    | 404    | 40     | 9          | 10   | 9     | 6.68e-05              | 0.000133 | 0.000525 | 0.000601       | 0.00133  | 0.00472 |
| AIRCRAFT_4                 | 144   | 84    | 404    | 20     | 9          | 10   | 9     | 6.7e-05               | 0.000114 | 0.000459 | 0.000603       | 0.00114  | 0.00413 |
| DOUBLEINVERTEDPENDULUM_3   | 144   | 84    | 404    | 50     | 6          | 18   | 8     | 0.000105              | 9.56e-05 | 0.000544 | 0.000632       | 0.00172  | 0.00435 |
| BALLONPLATE_1              | 152   | 77    | 257    | 47     | 8          | 15   | 10    | 7.75e-05              | 8.85e-05 | 0.000745 | 0.00062        | 0.00133  | 0.00745 |
| BALLONPLATE_2              | 152   | 77    | 257    | 47     | 7          | 14   | 7     | 7.83e-05              | 8.94e-05 | 0.000571 | 0.000548       | 0.00125  | 0.004   |
| BALLONPLATE_3              | 152   | 77    | 257    | 47     | 7          | 17   | 9     | 7.9e-05               | 0.000106 | 0.000541 | 0.000553       | 0.00179  | 0.00487 |
| DCMOTOR_1                  | 144   | 94    | 424    | 32     | 9          | -    | -     | 8.2e-05               | -        | -        | 0.000738       | -        | -       |
| AIRCRAFT_10                | 164   | 104   | 444    | 20     | 9          | 10   | 10    | 8.14e-05              | 0.000127 | 0.00055  | 0.000733       | 0.00127  | 0.0055  |
| AIRCRAFT_11                | 164   | 104   | 444    | 64     | 9          | 12   | -     | 8.04e-05              | 8.75e-05 | -        | 0.000724       | 0.00105  | -       |
| AIRCRAFT_12                | 164   | 104   | 444    | 64     | 9          | 12   | -     | 7.58e-05              | 8.7e-05  | -        | 0.000682       | 0.00104  | -       |
| TOYEXAMPLE_4               | 202   | 152   | 502    | 151    | 9          | -    | -     | 9.52e-05              | -        | -        | 0.000856       | -        | -       |
| BALLONPLATE_4              | 252   | 127   | 427    | 77     | 9          | 19   | 11    | 0.00011               | 0.000155 | 0.0013   | 0.000989       | 0.00294  | 0.0143  |
| HELICOPTER_2               | 218   | 166   | 538    | 175    | 6          | 21   | -     | 0.000164              | 0.000165 | -        | 0.000983       | 0.00347  | -       |
| SHELL_1                    | 249   | 159   | 559    | 60     | 7          | 15   | 8     | 0.00018               | 0.000226 | 0.00147  | 0.00126        | 0.00339  | 0.0118  |
| SHELL_3                    | 249   | 159   | 559    | 60     | 11         | 20   | 15    | 0.000151              | 0.000216 | 0.00139  | 0.00166        | 0.00433  | 0.0208  |
| NONLINEARCSTR_1            | 244   | 204   | 804    | 120    | 10         | -    | 22    | 0.000138              | -        | 0.00209  | 0.00138        | -        | 0.0459  |
| NONLINEARCSTR_2            | 244   | 204   | 804    | 120    | 10         | -    | 22    | 0.000134              | -        | 0.00208  | 0.00134        | -        | 0.0459  |
| DCMOTOR_2                  | 284   | 184   | 844    | 62     | 10         | 16   | 21    | 0.000166              | 0.000142 | 0.00139  | 0.00166        | 0.00227  | 0.0292  |
| DCMOTOR_5                  | 284   | 184   | 844    | 62     | 10         | 16   | -     | 0.000148              | 0.000146 | -        | 0.00148        | 0.00234  | -       |
| DCMOTOR_6                  | 284   | 184   | 844    | 62     | 9          | 16   | -     | 0.000155              | 0.00015  | -        | 0.0014         | 0.0024   | -       |
| ROBOTARM_2                 | 324   | 204   | 684    | 124    | 8          | -    | -     | 0.000246              | -        | -        | 0.00197        | -        | -       |
| SPACECRAFT_1               | 367   | 187   | 807    | 110    | 10         | 18   | 14    | 0.000165              | 0.000198 | 0.00201  | 0.00165        | 0.00356  | 0.0282  |
| SPACECRAFT_2               | 367   | 187   | 807    | 110    | 10         | 18   | 14    | 0.000165              | 0.000197 | 0.00201  | 0.00165        | 0.00354  | 0.0281  |
| BINARYDISTILLATIONCOLUMN_1 | 311   | 266   | 2666   | 90     | 9          | 18   | 13    | 0.000381              | 0.000386 | 0.00221  | 0.00343        | 0.00694  | 0.0287  |
| BINARYDISTILLATIONCOLUMN_2 | 311   | 266   | 2666   | 90     | 9          | 18   | 13    | 0.000379              | 0.000431 | 0.0022   | 0.00341        | 0.00776  | 0.0286  |

Table 2: Solve times and iteration counts for the Optimal Control problem set

| Problem                  | vars. | cons. | nnz(A) | nnz(P) | <u>iterations</u> |      |       | <u>time per iteration(s)</u> |          |         | <u>total time (s)</u> |         |        |
|--------------------------|-------|-------|--------|--------|-------------------|------|-------|------------------------------|----------|---------|-----------------------|---------|--------|
|                          |       |       |        |        | ClarabelRs        | ECOS | Mosek | ClarabelRs                   | ECOS     | Mosek   | ClarabelRs            | ECOS    | Mosek  |
| QUADCOPTER_1             | 382   | 292   | 1162   | 110    | 8                 | 16   | 10    | 0.00026                      | 0.000389 | 0.00245 | 0.00208               | 0.00623 | 0.0245 |
| QUADCOPTER_6             | 382   | 292   | 1162   | 172    | 8                 | 16   | 12    | 0.000293                     | 0.000366 | 0.00259 | 0.00235               | 0.00585 | 0.031  |
| TOYEXAMPLE_5             | 402   | 302   | 1002   | 301    | 10                | 27   | -     | 0.000185                     | 0.000259 | -       | 0.00185               | 0.007   | -      |
| SHELL_2                  | 489   | 309   | 1109   | 120    | 7                 | 15   | 9     | 0.000344                     | 0.000435 | 0.0035  | 0.00241               | 0.00653 | 0.0315 |
| TRIPLEINVERTEDPENDULUM_1 | 456   | 366   | 2166   | 201    | 8                 | -    | 16    | 0.000579                     | -        | 0.00391 | 0.00463               | -       | 0.0625 |
| SPRINGMASS_2             | 566   | 286   | 1646   | 181    | 7                 | 18   | 18    | 0.000312                     | 0.000353 | 0.00377 | 0.00219               | 0.00635 | 0.0679 |
| SPRINGMASS_3             | 566   | 286   | 1646   | 166    | 8                 | 21   | -     | 0.000293                     | 0.00032  | -       | 0.00234               | 0.00672 | -      |
| TRIPLEINVERTEDPENDULUM_2 | 636   | 366   | 2346   | 201    | 8                 | 21   | 13    | 0.000658                     | 0.000381 | 0.00452 | 0.00527               | 0.00801 | 0.0588 |
| TRIPLEINVERTEDPENDULUM_3 | 636   | 366   | 2346   | 201    | 9                 | 24   | -     | 0.000648                     | 0.000363 | -       | 0.00583               | 0.00872 | -      |
| QUADCOPTER_5             | 572   | 572   | 2212   | 220    | 27                | -    | -     | 0.000473                     | -        | -       | 0.0128                | -       | -      |
| AIRCRAFT_13              | 804   | 504   | 2204   | 304    | 11                | 23   | -     | 0.000367                     | 0.00048  | -       | 0.00403               | 0.011   | -      |
| QUADCOPTER_2             | 752   | 572   | 2312   | 220    | 8                 | 18   | 11    | 0.000484                     | 0.000879 | 0.00437 | 0.00387               | 0.0158  | 0.0481 |
| QUADCOPTER_4             | 752   | 572   | 2312   | 220    | 12                | 19   | 16    | 0.000465                     | 0.000739 | 0.00396 | 0.00558               | 0.0141  | 0.0634 |
| SPRINGMASS_4             | 1126  | 566   | 3286   | 341    | 8                 | 17   | 15    | 0.00062                      | 0.000631 | 0.0058  | 0.00496               | 0.0107  | 0.087  |
| DCMOTOR_3                | 1404  | 904   | 4204   | 302    | 11                | -    | -     | 0.000801                     | -        | -       | 0.00881               | -       | -      |
| DCMOTOR_4                | 1404  | 904   | 4204   | 302    | 11                | 25   | -     | 0.000734                     | 0.000634 | -       | 0.00807               | 0.0159  | -      |
| QUADCOPTER_3             | 1862  | 1412  | 5762   | 550    | 8                 | 20   | 10    | 0.00121                      | 0.00238  | 0.00935 | 0.00968               | 0.0476  | 0.0935 |
| NONLINEARCHAIN_13        | 2457  | 2397  | 30857  | 660    | 9                 | 22   | -     | 0.00537                      | 0.00579  | -       | 0.0483                | 0.127   | -      |
| NONLINEARCHAIN_3         | 2457  | 2397  | 30857  | 660    | 9                 | 22   | -     | 0.00536                      | 0.0058   | -       | 0.0483                | 0.128   | -      |
| NONLINEARCHAIN_14        | 2637  | 2397  | 31037  | 660    | 10                | 23   | -     | 0.00532                      | 0.00663  | -       | 0.0532                | 0.153   | -      |
| NONLINEARCHAIN_4         | 2637  | 2397  | 31037  | 660    | 10                | 23   | -     | 0.00535                      | 0.00666  | -       | 0.0535                | 0.153   | -      |
| SPRINGMASS_1             | 5606  | 2806  | 16406  | 1621   | 12                | -    | -     | 0.00444                      | -        | -       | 0.0532                | -       | -      |
| NONLINEARCHAIN_1         | 9657  | 9417  | 123257 | 2640   | 8                 | 28   | -     | 0.0225                       | 0.0232   | -       | 0.18                  | 0.649   | -      |
| NONLINEARCHAIN_11        | 9657  | 9417  | 123257 | 2640   | 8                 | 28   | -     | 0.0223                       | 0.0229   | -       | 0.178                 | 0.642   | -      |
| NONLINEARCHAIN_12        | 10377 | 9417  | 123977 | 2640   | 9                 | -    | -     | 0.0219                       | -        | -       | 0.197                 | -       | -      |
| NONLINEARCHAIN_2         | 10377 | 9417  | 123977 | 2640   | 9                 | -    | -     | 0.022                        | -        | -       | 0.198                 | -       | -      |

Table 3: Solve times and iteration counts for the SuiteSparse least-squares problem set

| Problem                | vars.   | cons.   | nnz(A)  | nnz(P) | iterations |      |       | time per iteration(s) |          |          | total time (s) |          |         |
|------------------------|---------|---------|---------|--------|------------|------|-------|-----------------------|----------|----------|----------------|----------|---------|
|                        |         |         |         |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek    | ClarabelRs     | ECOS     | Mosek   |
| NYPA_MARAGAL_1_LASSO   | 60      | 60      | 322     | 32     | 9          | 15   | 10    | 5.02e-05              | 6.17e-05 | 0.000325 | 0.000452       | 0.000925 | 0.00325 |
| NYPA_MARAGAL_1_HUBER   | 96      | 110     | 394     | 32     | 6          | 10   | 5     | 5.97e-05              | 8.64e-05 | 0.000603 | 0.000358       | 0.000864 | 0.00301 |
| HB_ASH85_LASSO         | 255     | 255     | 948     | 85     | 8          | 18   | 15    | 0.00018               | 0.000325 | 0.00169  | 0.00144        | 0.00585  | 0.0253  |
| HB_ASH85_HUBER         | 255     | 340     | 948     | 85     | 6          | 6    | 12    | 0.000297              | 0.000344 | 0.00199  | 0.00178        | 0.00206  | 0.0238  |
| HB_ASH219_LASSO        | 389     | 389     | 997     | 219    | 8          | 18   | 16    | 0.000247              | 0.000354 | 0.00255  | 0.00198        | 0.00637  | 0.0408  |
| HB_ASH331_LASSO        | 539     | 539     | 1409    | 331    | 7          | 18   | 21    | 0.000503              | 0.0005   | 0.00402  | 0.00352        | 0.009    | 0.0845  |
| HB_ABB313_LASSO        | 665     | 665     | 2574    | 313    | 9          | 22   | -     | 0.000607              | 0.000686 | -        | 0.00546        | 0.0151   | -       |
| HB_ASH219_HUBER        | 657     | 742     | 1533    | 219    | 9          | 16   | 16    | 0.0003                | 0.000711 | 0.00417  | 0.0027         | 0.0114   | 0.0667  |
| HB_ASH292_LASSO        | 876     | 876     | 3668    | 292    | 8          | 24   | 19    | 0.000848              | 0.000992 | 0.00617  | 0.00678        | 0.0238   | 0.117   |
| HB_ASH608_LASSO        | 984     | 984     | 2576    | 608    | 8          | -    | -     | 0.00047               | -        | -        | 0.00376        | -        | -       |
| HB_ASH292_HUBER        | 876     | 1168    | 3668    | 292    | 6          | 11   | 15    | 0.000914              | 0.00138  | 0.00502  | 0.00549        | 0.0152   | 0.0753  |
| HB_ABB313_HUBER        | 939     | 1115    | 3122    | 313    | 9          | 19   | 17    | 0.000498              | 0.000995 | 0.0062   | 0.00448        | 0.0189   | 0.105   |
| HB_ASH331_HUBER        | 993     | 1097    | 2317    | 331    | 8          | 16   | 15    | 0.000434              | 0.00104  | 0.00546  | 0.00347        | 0.0166   | 0.082   |
| NYPA_MARAGAL_2_LASSO   | 1255    | 1255    | 6312    | 555    | 7          | 14   | 11    | 0.00122               | 0.00185  | 0.011    | 0.00854        | 0.0259   | 0.121   |
| HB_ASH958_LASSO        | 1542    | 1542    | 4042    | 958    | 7          | -    | 21    | 0.000786              | -        | 0.00901  | 0.00551        | -        | 0.189   |
| HB_ILLC1033_LASSO      | 1673    | 1673    | 7032    | 1033   | 19         | -    | -     | 0.000932              | -        | -        | 0.0177         | -        | -       |
| HB_WELL1033_LASSO      | 1673    | 1673    | 7045    | 1033   | 13         | -    | -     | 0.000894              | -        | -        | 0.0116         | -        | -       |
| NYPA_MARAGAL_2_HUBER   | 1665    | 2015    | 7132    | 555    | 8          | 16   | 12    | 0.00127               | 0.0029   | 0.00951  | 0.0101         | 0.0463   | 0.114   |
| HB_ASH608_HUBER        | 1824    | 2012    | 4256    | 608    | 9          | 18   | 16    | 0.000756              | 0.00127  | 0.00938  | 0.00681        | 0.0228   | 0.15    |
| HB_ASH958_HUBER        | 2874    | 3166    | 6706    | 958    | 9          | 17   | 18    | 0.00131               | 0.00208  | 0.0154   | 0.0118         | 0.0354   | 0.277   |
| HB_ILLC1033_HUBER      | 3099    | 3419    | 9884    | 1033   | 7          | 11   | 7     | 0.002                 | 0.00306  | 0.0177   | 0.014          | 0.0337   | 0.124   |
| HB_WELL1033_HUBER      | 3099    | 3419    | 9897    | 1033   | 7          | 12   | 7     | 0.00168               | 0.00387  | 0.0175   | 0.0118         | 0.0465   | 0.123   |
| HB_ILLC1850_LASSO      | 3274    | 3274    | 13334   | 1850   | 13         | -    | -     | 0.00212               | -        | -        | 0.0275         | -        | -       |
| HB_WELL1850_LASSO      | 3274    | 3274    | 13453   | 1850   | 12         | -    | -     | 0.00201               | -        | -        | 0.0241         | -        | -       |
| NYPA_MARAGAL_3_LASSO   | 3410    | 3410    | 23521   | 1690   | 7          | 15   | 9     | 0.00921               | 0.0102   | 0.0367   | 0.0645         | 0.153    | 0.33    |
| NYPA_MARAGAL_4_LASSO   | 4032    | 4032    | 32819   | 1964   | 6          | 17   | 9     | 0.0228                | 0.0253   | 0.0427   | 0.137          | 0.429    | 0.384   |
| NYPA_MARAGAL_3_HUBER   | 5070    | 5930    | 26841   | 1690   | 8          | 18   | 11    | 0.00971               | 0.0112   | 0.0477   | 0.0777         | 0.202    | 0.524   |
| HB_ILLC1850_HUBER      | 5550    | 6262    | 17886   | 1850   | 7          | 11   | 13    | 0.00343               | 0.00722  | 0.0297   | 0.024          | 0.0795   | 0.386   |
| HB_WELL1850_HUBER      | 5550    | 6262    | 18005   | 1850   | 7          | 11   | 13    | 0.00342               | 0.00718  | 0.034    | 0.024          | 0.079    | 0.441   |
| NYPA_MARAGAL_4_HUBER   | 5892    | 6926    | 36539   | 1964   | 7          | 18   | 13    | 0.0252                | 0.0245   | 0.0437   | 0.177          | 0.441    | 0.568   |
| NYPA_MARAGAL_5_LASSO   | 11294   | 11294   | 111025  | 4654   | 8          | 21   | 9     | 0.156                 | 0.168    | 0.168    | 1.25           | 3.53     | 1.51    |
| NYPA_MARAGAL_5_HUBER   | 13962   | 17282   | 116361  | 4654   | 8          | 20   | -     | 0.17                  | 0.168    | -        | 1.36           | 3.36     | -       |
| NYPA_MARAGAL_6_LASSO   | 41559   | 41559   | 599557  | 21255  | 7          | -    | 8     | 4.88                  | -        | 1.4      | 34.1           | -        | 11.2    |
| NYPA_MARAGAL_6_HUBER   | 63765   | 73917   | 643969  | 21255  | 7          | -    | -     | 5.41                  | -        | -        | 37.9           | -        | -       |
| PEREYRA_LANDMARK_LASSO | 77360   | 77360   | 1229616 | 71952  | 8          | -    | -     | 0.185                 | -        | -        | 1.48           | -        | -       |
| NYPA_MARAGAL_7_LASSO   | 99973   | 99973   | 1353638 | 46845  | 7          | -    | -     | 11                    | -        | -        | 76.7           | -        | -       |
| NYPA_MARAGAL_8_HUBER   | 99636   | 174713  | 1474475 | 33212  | 8          | -    | 16    | 6.5                   | -        | 1.41     | 52             | -        | 22.5    |
| NYPA_MARAGAL_7_HUBER   | 140535  | 167099  | 1434762 | 46845  | 10         | -    | -     | 10.9                  | -        | -        | 109            | -        | -       |
| NYPA_MARAGAL_8_LASSO   | 183366  | 183366  | 1641935 | 33212  | 7          | -    | -     | 6.59                  | -        | -        | 46.1           | -        | -       |
| PEREYRA_LANDMARK_HUBER | 215856  | 218560  | 1506608 | 71952  | 82         | -    | -     | 0.176                 | -        | -        | 14.4           | -        | -       |
| ANSYS_DELOR64K_HUBER   | 194157  | 1979502 | 975735  | 64719  | 7          | -    | 14    | 0.636                 | -        | 1.61     | 4.45           | -        | 22.5    |
| ANSYS_DELOR338K_HUBER  | 1029708 | 1916766 | 5927779 | 343236 | 8          | -    | 4     | 1.46                  | -        | 18.1     | 11.7           | -        | 72.5    |
| ANSYS_DELOR295K_HUBER  | 887202  | 2711130 | 3879993 | 295734 | 8          | -    | 4     | 1.35                  | -        | 20       | 10.8           | -        | 80.2    |
| ANSYS_DELOR338K_LASSO  | 2117352 | 2117352 | 8103067 | 343236 | 7          | -    | -     | 2.14                  | -        | -        | 15             | -        | -       |
| ANSYS_DELOR64K_LASSO   | 3635409 | 3635409 | 7858239 | 64719  | 8          | -    | -     | 2.61                  | -        | -        | 20.9           | -        | -       |
| ANSYS_DELOR295K_LASSO  | 3943590 | 3943590 | 9992769 | 295734 | 8          | -    | -     | 3.17                  | -        | -        | 25.4           | -        | -       |

Table 4: Solve times and iteration counts for the NETLIB Feasible LP problem set

| Problem  | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |          | total time (s) |          |         |
|----------|-------|-------|--------|--------|------------|------|-------|-----------------------|----------|----------|----------------|----------|---------|
|          |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek    | ClarabelRs     | ECOS     | Mosek   |
| AFIRO    | 78    | 51    | 153    | 0      | 8          | 9    | 11    | 6.06e-05              | 3.05e-05 | 0.000263 | 0.000485       | 0.000275 | 0.00289 |
| KB2      | 120   | 68    | 390    | 0      | 16         | 16   | 28    | 0.000105              | 6.32e-05 | 0.000208 | 0.00168        | 0.00101  | 0.00583 |
| SC50A    | 128   | 78    | 238    | 0      | 9          | 11   | 11    | 0.000209              | 4.84e-05 | 0.000276 | 0.00188        | 0.000532 | 0.00304 |
| SC50B    | 128   | 78    | 226    | 0      | 8          | 10   | 9     | 7.59e-05              | 4.58e-05 | 0.000305 | 0.000607       | 0.000458 | 0.00274 |
| BLEND    | 188   | 114   | 636    | 0      | 11         | 12   | 14    | 0.000387              | 0.000102 | 0.00102  | 0.00426        | 0.00122  | 0.0143  |
| ADLITTLE | 194   | 138   | 562    | 0      | 12         | 12   | 16    | 0.000411              | 9.69e-05 | 0.000976 | 0.00494        | 0.00116  | 0.0156  |
| SHARE2B  | 258   | 162   | 939    | 0      | 11         | 13   | 13    | 0.0005                | 0.000143 | 0.00128  | 0.00551        | 0.00186  | 0.0166  |
| SC105    | 268   | 163   | 503    | 0      | 10         | 12   | 12    | 0.00033               | 0.000103 | 0.000518 | 0.0033         | 0.00123  | 0.00622 |
| STOCFOR1 | 282   | 165   | 666    | 0      | 16         | 15   | 26    | 0.000184              | 0.000126 | 0.00124  | 0.00294        | 0.00189  | 0.0323  |
| SCAGR7   | 314   | 185   | 650    | 0      | 15         | 15   | 15    | 0.000302              | 0.00011  | 0.00125  | 0.00452        | 0.00165  | 0.0187  |
| RECIPE   | 364   | 204   | 960    | 0      | 10         | 11   | 7     | 0.000543              | 0.000149 | 0.00184  | 0.00543        | 0.00164  | 0.0129  |
| SHARE1B  | 370   | 253   | 1432   | 0      | 22         | 27   | 45    | 0.000471              | 0.000228 | 0.00177  | 0.0104         | 0.00616  | 0.0798  |
| NUG05    | 435   | 225   | 1275   | 0      | 7          | 7    | 7     | 0.00144               | 0.000839 | 0.00199  | 0.0101         | 0.00587  | 0.014   |
| BEACONFD | 468   | 295   | 3703   | 0      | 9          | 10   | 14    | 0.00107               | 0.000561 | 0.0026   | 0.0096         | 0.00561  | 0.0365  |
| ISRAEL   | 490   | 316   | 2759   | 0      | 19         | 23   | 33    | 0.000508              | 0.000398 | 0.0024   | 0.00965        | 0.00915  | 0.0793  |
| BRANDY   | 523   | 303   | 2505   | 0      | 15         | 18   | 24    | 0.000737              | 0.000448 | 0.00245  | 0.0111         | 0.00806  | 0.0587  |
| SC205    | 522   | 317   | 982    | 0      | 13         | 13   | 13    | 0.000412              | 0.000247 | 0.00145  | 0.00536        | 0.00321  | 0.0189  |
| LOTFI    | 519   | 366   | 1502   | 0      | 19         | 20   | 17    | 0.000543              | 0.000247 | 0.00212  | 0.0103         | 0.00495  | 0.036   |
| BORE3D   | 578   | 334   | 1793   | 0      | 19         | 20   | 40    | 0.000596              | 0.000339 | 0.00244  | 0.0113         | 0.00679  | 0.0977  |
| VTP.BASE | 608   | 346   | 1461   | 0      | 31         | 33   | 19    | 0.000442              | 0.000269 | 0.00267  | 0.0137         | 0.00888  | 0.0507  |
| GROW7    | 721   | 301   | 3193   | 0      | 13         | 12   | 12    | 0.00067               | 0.000547 | 0.00483  | 0.00871        | 0.00657  | 0.058   |
| E226     | 695   | 472   | 3240   | 0      | 22         | 24   | 40    | 0.000643              | 0.000525 | 0.00284  | 0.0141         | 0.0126   | 0.114   |
| BANDM    | 777   | 472   | 2966   | 0      | 18         | 21   | 24    | 0.000763              | 0.000656 | 0.00339  | 0.0137         | 0.0138   | 0.0813  |
| SCORPION | 854   | 466   | 2000   | 0      | 12         | 12   | 12    | 0.000793              | 0.000416 | 0.00238  | 0.00952        | 0.00499  | 0.0286  |
| NUG06    | 858   | 486   | 2718   | 0      | 7          | 7    | 7     | 0.00303               | 0.00287  | 0.00456  | 0.0212         | 0.0201   | 0.032   |
| CAPRI    | 870   | 482   | 2495   | 0      | 21         | 22   | 16    | 0.000669              | 0.000522 | 0.00397  | 0.014          | 0.0115   | 0.0635  |
| SCFXM1   | 930   | 600   | 3332   | 0      | 19         | 22   | 18    | 0.000853              | 0.000702 | 0.00401  | 0.0162         | 0.0154   | 0.0722  |
| STAIR    | 970   | 614   | 4617   | 0      | 22         | 23   | 15    | 0.00112               | 0.000898 | 0.00704  | 0.0246         | 0.0206   | 0.106   |
| SCSD1    | 837   | 760   | 3148   | 0      | 10         | 11   | 13    | 0.000773              | 0.000453 | 0.0028   | 0.00773        | 0.00499  | 0.0364  |
| TUFF     | 985   | 628   | 5213   | 0      | 21         | -    | 22    | 0.00124               | -        | 0.00488  | 0.0261         | -        | 0.107   |
| SCTAP1   | 960   | 660   | 2532   | 0      | 26         | 25   | 16    | 0.000569              | 0.000402 | 0.00365  | 0.0148         | 0.0101   | 0.0584  |
| AGG      | 1103  | 615   | 3477   | 0      | 45         | 43   | 43    | 0.000992              | 0.000554 | 0.00246  | 0.0446         | 0.0238   | 0.106   |
| SCAGR25  | 1142  | 671   | 2396   | 0      | 17         | 18   | 19    | 0.000502              | 0.000376 | 0.00411  | 0.00853        | 0.00676  | 0.0781  |
| DEGEN2   | 1201  | 757   | 4958   | 0      | 11         | 12   | 11    | 0.00176               | 0.0016   | 0.00936  | 0.0194         | 0.0192   | 0.103   |
| AGG2     | 1274  | 758   | 5498   | 0      | 26         | 28   | 26    | 0.00205               | 0.00188  | 0.00569  | 0.0533         | 0.0526   | 0.148   |
| AGG3     | 1274  | 758   | 5514   | 0      | 25         | 29   | 27    | 0.00207               | 0.00182  | 0.00609  | 0.0518         | 0.0529   | 0.165   |
| ETAMACRO | 1351  | 816   | 3488   | 0      | 25         | 33   | 33    | 0.00185               | 0.00142  | 0.00608  | 0.0464         | 0.047    | 0.201   |
| GROW15   | 1545  | 645   | 6865   | 0      | 13         | 13   | 14    | 0.00142               | 0.00111  | 0.00946  | 0.0185         | 0.0145   | 0.132   |
| NUG07    | 1533  | 931   | 5145   | 0      | 11         | 11   | 9     | 0.00652               | 0.00919  | 0.0178   | 0.0717         | 0.101    | 0.16    |
| FFFFF800 | 1552  | 1028  | 7429   | 0      | 36         | 49   | 25    | 0.00248               | 0.00202  | 0.0076   | 0.0891         | 0.0992   | 0.19    |
| FINNIS   | 1597  | 1064  | 3860   | 0      | 36         | 44   | 26    | 0.00106               | 0.000707 | 0.00631  | 0.0381         | 0.0311   | 0.164   |
| PILOT4   | 1692  | 1123  | 6546   | 0      | 38         | 72   | 37    | 0.00201               | 0.00114  | 0.00793  | 0.0765         | 0.0821   | 0.294   |
| SCSD6    | 1497  | 1350  | 5666   | 0      | 13         | 13   | 13    | 0.00103               | 0.000806 | 0.00487  | 0.0134         | 0.0105   | 0.0633  |
| STANDATA | 1737  | 1274  | 4608   | 0      | 12         | 15   | 20    | 0.0011                | 0.000763 | 0.00566  | 0.0132         | 0.0115   | 0.113   |
| SCRS8    | 1765  | 1275  | 4563   | 0      | 28         | 29   | 37    | 0.00131               | 0.000916 | 0.00643  | 0.0367         | 0.0266   | 0.238   |
| SCFXM2   | 1860  | 1200  | 6669   | 0      | 22         | 23   | 20    | 0.00169               | 0.00144  | 0.00768  | 0.0371         | 0.0331   | 0.154   |

Table 4: Solve times and iteration counts for the NETLIB Feasible LP problem set

| Problem  | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |         | total time (s) |        |        |
|----------|-------|-------|--------|--------|------------|------|-------|-----------------------|----------|---------|----------------|--------|--------|
|          |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek   | ClarabelRs     | ECOS   | Mosek  |
| STANDMPS | 1845  | 1274  | 5256   | 0      | 17         | 18   | 29    | 0.00128               | 0.000879 | 0.00609 | 0.0218         | 0.0158 | 0.176  |
| FIT1D    | 2099  | 1049  | 15502  | 0      | 28         | 30   | 26    | 0.00198               | 0.00163  | 0.00294 | 0.0555         | 0.0489 | 0.0763 |
| GFRD_PNC | 2034  | 1160  | 3863   | 0      | 14         | 17   | 24    | 0.00108               | 0.000767 | 0.00664 | 0.0151         | 0.013  | 0.159  |
| GROW22   | 2266  | 946   | 10078  | 0      | 14         | 14   | 14    | 0.00209               | 0.00155  | 0.0136  | 0.0293         | 0.0217 | 0.19   |
| STANDGUB | 1848  | 1383  | 4825   | 0      | 12         | 15   | 21    | 0.00116               | 0.000816 | 0.00573 | 0.0139         | 0.0122 | 0.12   |
| SHIP04S  | 1908  | 1506  | 5906   | 0      | 17         | 16   | 28    | 0.00143               | 0.00111  | 0.00571 | 0.0243         | 0.0177 | 0.16   |
| BNL1     | 2229  | 1586  | 7118   | 0      | 57         | 58   | 36    | 0.00222               | 0.00182  | 0.00851 | 0.127          | 0.105  | 0.306  |
| PEROLD   | 2309  | 1506  | 7832   | 0      | 48         | -    | 44    | 0.00336               | -        | 0.00978 | 0.161          | -      | 0.43   |
| MODSZK1  | 2305  | 1620  | 4786   | 0      | 27         | 31   | 27    | 0.00158               | 0.000878 | 0.00783 | 0.0425         | 0.0272 | 0.211  |
| NUG08    | 2544  | 1632  | 8928   | 0      | 9          | 9    | 7     | 0.0134                | 0.0307   | 0.0389  | 0.121          | 0.277  | 0.272  |
| QAP8     | 2544  | 1632  | 8928   | 0      | 9          | 9    | 7     | 0.0128                | 0.032    | 0.0333  | 0.115          | 0.288  | 0.233  |
| SHELL    | 2430  | 1777  | 5452   | 0      | 17         | 18   | 16    | 0.00141               | 0.00108  | 0.00895 | 0.0239         | 0.0195 | 0.143  |
| FIT1P    | 2703  | 1677  | 11944  | 0      | 18         | 23   | 21    | 0.00186               | 0.00137  | 0.00862 | 0.0335         | 0.0315 | 0.181  |
| 25FV47   | 2697  | 1876  | 12581  | 0      | 27         | 28   | 29    | 0.00466               | 0.00442  | 0.0122  | 0.126          | 0.124  | 0.355  |
| SCFXM3   | 2790  | 1800  | 10006  | 0      | 22         | 24   | 20    | 0.00256               | 0.00214  | 0.0117  | 0.0563         | 0.0514 | 0.234  |
| SHIP04L  | 2568  | 2166  | 8546   | 0      | 17         | 19   | 23    | 0.00187               | 0.00141  | 0.00764 | 0.0318         | 0.0268 | 0.176  |
| MAROS    | 2812  | 1966  | 12103  | 0      | 28         | 34   | 36    | 0.00464               | 0.00325  | 0.0111  | 0.13           | 0.11   | 0.398  |
| GANGES   | 3412  | 1706  | 9040   | 0      | 32         | 37   | 16    | 0.00238               | 0.00181  | 0.0148  | 0.0762         | 0.0668 | 0.236  |
| WOOD1P   | 2839  | 2595  | 72811  | 0      | 16         | 18   | 14    | 0.00981               | 0.0085   | 0.0257  | 0.157          | 0.153  | 0.36   |
| SHIP08S  | 3245  | 2467  | 9661   | 0      | 16         | 17   | 20    | 0.00245               | 0.00185  | 0.0104  | 0.0392         | 0.0315 | 0.207  |
| PILOT_JA | 3458  | 2267  | 17495  | 0      | 61         | -    | 35    | 0.012                 | -        | 0.0169  | 0.733          | -      | 0.593  |
| SCSD8    | 3147  | 2750  | 11334  | 0      | 11         | 12   | 12    | 0.00205               | 0.00155  | 0.0106  | 0.0225         | 0.0186 | 0.128  |
| SCTAP2   | 3590  | 2500  | 9834   | 0      | 16         | 16   | 28    | 0.00213               | 0.00174  | 0.0115  | 0.0341         | 0.0278 | 0.322  |
| PILOTNOV | 3761  | 2446  | 16117  | 0      | 21         | 22   | 22    | 0.0133                | 0.0063   | 0.0188  | 0.279          | 0.139  | 0.413  |
| DEGEN3   | 4107  | 2604  | 28036  | 0      | 14         | 15   | 11    | 0.0166                | 0.0139   | 0.0468  | 0.233          | 0.209  | 0.515  |
| PILOT_WE | 3864  | 2928  | 12407  | 0      | 66         | 73   | 59    | 0.0036                | 0.00259  | 0.0133  | 0.237          | 0.189  | 0.785  |
| SHIP12S  | 4020  | 2869  | 11153  | 0      | 21         | 23   | 25    | 0.00284               | 0.00209  | 0.0117  | 0.0597         | 0.0482 | 0.294  |
| CZPROB   | 4491  | 3562  | 14270  | 0      | 43         | 43   | 25    | 0.00292               | 0.00213  | 0.0135  | 0.125          | 0.0916 | 0.338  |
| SCTAP3   | 4820  | 3340  | 13074  | 0      | 16         | 16   | 35    | 0.00293               | 0.00239  | 0.0155  | 0.0468         | 0.0382 | 0.542  |
| STOCFOR2 | 5202  | 3045  | 12402  | 0      | 28         | 27   | 32    | 0.00357               | 0.00283  | 0.0136  | 0.1            | 0.0765 | 0.436  |
| SIERRA   | 5978  | 2735  | 12752  | 0      | 18         | 21   | 35    | 0.00327               | 0.00283  | 0.0212  | 0.0588         | 0.0595 | 0.742  |
| CYCLE    | 5344  | 3371  | 24675  | 0      | 38         | -    | 47    | 0.00741               | -        | 0.0241  | 0.282          | -      | 1.13   |
| SHIP08L  | 5141  | 4363  | 17245  | 0      | 18         | 19   | 21    | 0.00444               | 0.00319  | 0.0157  | 0.0799         | 0.0607 | 0.329  |
| BNL2     | 6810  | 4486  | 19482  | 0      | 34         | 38   | 33    | 0.0206                | 0.0094   | 0.0284  | 0.701          | 0.357  | 0.939  |
| PILOT    | 7341  | 4860  | 50275  | 0      | 65         | -    | 59    | 0.0284                | -        | 0.0368  | 1.85           | -      | 2.17   |
| SHIP12L  | 6684  | 5533  | 21809  | 0      | 29         | 28   | 22    | 0.00526               | 0.00401  | 0.0201  | 0.152          | 0.112  | 0.441  |
| D6CUBE   | 6599  | 6184  | 43888  | 0      | 18         | -    | 12    | 0.0265                | -        | 0.0469  | 0.476          | -      | 0.562  |
| KEN_07   | 9630  | 3602  | 15608  | 0      | 17         | 16   | 20    | 0.00431               | 0.00346  | 0.0327  | 0.0734         | 0.0553 | 0.654  |
| D2Q06C   | 8002  | 5831  | 38912  | 0      | 32         | 48   | 48    | 0.0341                | 0.0192   | 0.0338  | 1.09           | 0.92   | 1.62   |
| GREENBEB | 8277  | 5598  | 36955  | 0      | 66         | 69   | 47    | 0.0315                | 0.0178   | 0.0331  | 2.08           | 1.23   | 1.56   |
| GREENBEA | 8280  | 5598  | 36958  | 0      | 42         | 44   | 55    | 0.0298                | 0.0174   | 0.0329  | 1.25           | 0.767  | 1.81   |
| CRE_C    | 9479  | 6411  | 22388  | 0      | 27         | 32   | 23    | 0.00695               | 0.00595  | 0.0356  | 0.188          | 0.19   | 0.819  |
| PILOT87  | 10288 | 6680  | 83207  | 0      | 101        | -    | 94    | 0.0476                | -        | 0.0648  | 4.8            | -      | 6.09   |
| WOODW    | 9516  | 8418  | 45905  | 0      | 26         | 32   | 19    | 0.0106                | 0.00846  | 0.0351  | 0.275          | 0.271  | 0.667  |
| CRE_A    | 10764 | 7248  | 25416  | 0      | 22         | 26   | 40    | 0.00802               | 0.00682  | 0.0363  | 0.177          | 0.177  | 1.45   |
| TRUSS    | 9806  | 8806  | 36642  | 0      | 20         | 20   | 20    | 0.0103                | 0.00893  | 0.036   | 0.205          | 0.179  | 0.72   |



**Table 4: Solve times and iteration counts for the NETLIB Feasible LP problem set**

| Problem  | vars.  | cons. | nnz(A) | nnz(P) | <u>iterations</u> |      |       | <u>time per iteration(s)</u> |         |        | <u>total time (s)</u> |       |       |
|----------|--------|-------|--------|--------|-------------------|------|-------|------------------------------|---------|--------|-----------------------|-------|-------|
|          |        |       |        |        | ClarabelRs        | ECOS | Mosek | ClarabelRs                   | ECOS    | Mosek  | ClarabelRs            | ECOS  | Mosek |
| PDS_02   | 12803  | 7716  | 26421  | 0      | 34                | 32   | 24    | 0.00839                      | 0.00721 | 0.0474 | 0.285                 | 0.231 | 1.14  |
| NUG12    | 12048  | 8856  | 47160  | 0      | 20                | 20   | 16    | 0.125                        | 1.1     | 0.192  | 2.49                  | 22.1  | 3.07  |
| QAP12    | 12048  | 8856  | 47160  | 0      | 20                | 20   | 16    | 0.119                        | 1.14    | 0.217  | 2.38                  | 22.9  | 3.47  |
| MAROS_r7 | 12544  | 9408  | 154256 | 0      | 14                | 15   | 13    | 0.111                        | 0.281   | 0.116  | 1.55                  | 4.21  | 1.51  |
| 80BAU3B  | 17309  | 12061 | 38311  | 0      | 37                | 41   | 25    | 0.0108                       | 0.011   | 0.0579 | 0.401                 | 0.45  | 1.45  |
| DFL001   | 18314  | 12230 | 47875  | 0      | -                 | 47   | 35    | -                            | 0.871   | 0.127  | -                     | 40.9  | 4.46  |
| FIT2D    | 21049  | 10524 | 150066 | 0      | 24                | 27   | 27    | 0.0158                       | 0.0154  | 0.0205 | 0.38                  | 0.417 | 0.553 |
| FIT2P    | 24025  | 13525 | 71309  | 0      | 21                | 23   | 21    | 0.014                        | 0.0107  | 0.0624 | 0.295                 | 0.247 | 1.31  |
| NUG15    | 28605  | 22275 | 117225 | 0      | 24                | 24   | 15    | 0.581                        | 10.4    | 4.49   | 13.9                  | 251   | 67.4  |
| QAP15    | 28605  | 22275 | 117225 | 0      | 24                | 24   | 17    | 0.604                        | 11.3    | 3.82   | 14.5                  | 270   | 65    |
| OSA_07   | 26185  | 25067 | 169879 | 0      | 23                | 24   | 27    | 0.0366                       | 0.0295  | 0.0988 | 0.841                 | 0.708 | 2.67  |
| STOCFOR3 | 40216  | 23541 | 96262  | 0      | 42                | 47   | 61    | 0.0325                       | 0.027   | 0.0805 | 1.37                  | 1.27  | 4.91  |
| PDS_06   | 48472  | 29351 | 101811 | 0      | 46                | 45   | 31    | 0.147                        | 0.144   | 0.204  | 6.75                  | 6.46  | 6.33  |
| KEN_11   | 57392  | 21349 | 91756  | 0      | 25                | 25   | 21    | 0.0328                       | 0.03    | 0.101  | 0.821                 | 0.75  | 2.12  |
| PDS_10   | 82638  | 49932 | 173685 | 0      | 61                | 64   | 38    | 0.291                        | 0.509   | 0.39   | 17.8                  | 32.6  | 14.8  |
| KEN_13   | 113950 | 42659 | 182564 | 0      | 27                | 27   | 29    | 0.0764                       | 0.0691  | 0.196  | 2.06                  | 1.86  | 5.68  |



Table 5: Solve times and iteration counts for the NETLIB Infeasible LP problem set

| Problem     | vars. | cons. | nnz(A) | nnz(P) | <u>iterations</u> |      |       | <u>time per iteration(s)</u> |          |          | <u>total time (s)</u> |          |          |
|-------------|-------|-------|--------|--------|-------------------|------|-------|------------------------------|----------|----------|-----------------------|----------|----------|
|             |       |       |        |        | ClarabelRs        | ECOS | Mosek | ClarabelRs                   | ECOS     | Mosek    | ClarabelRs            | ECOS     | Mosek    |
| LPLITEST2   | 22    | 13    | 39     | 0      | 6                 | 6    | 4     | 1.63e-05                     | 1.2e-05  | 0.00019  | 9.75e-05              | 7.23e-05 | 0.00076  |
| LPLGALENET  | 30    | 14    | 44     | 0      | 6                 | 5    | 4     | 2.2e-05                      | 1.5e-05  | 0.000187 | 0.000132              | 7.5e-05  | 0.000749 |
| LPLITEST6   | 28    | 17    | 46     | 0      | 5                 | 8    | 4     | 2.42e-05                     | 1.67e-05 | 0.00024  | 0.000121              | 0.000134 | 0.000961 |
| LPLBGPRTTR  | 60    | 40    | 110    | 0      | 8                 | 9    | 7     | 3.33e-05                     | 2.84e-05 | 0.000262 | 0.000266              | 0.000256 | 0.00183  |
| LPLWOODINFE | 138   | 89    | 243    | 0      | 7                 | 8    | 6     | 7.6e-05                      | 5.56e-05 | 0.000569 | 0.000532              | 0.000445 | 0.00342  |
| LPLKLEIN1   | 162   | 108   | 858    | 0      | 18                | 18   | 21    | 0.000178                     | 0.000164 | 0.000433 | 0.00321               | 0.00296  | 0.00909  |
| LPLFOREST6  | 202   | 131   | 382    | 0      | 8                 | 9    | 10    | 9.06e-05                     | 8.71e-05 | 0.000913 | 0.000725              | 0.000784 | 0.00913  |
| LPLLEX73A   | 404   | 211   | 668    | 0      | 7                 | 6    | 15    | 0.000207                     | 0.000179 | 0.00115  | 0.00145               | 0.00107  | 0.0172   |
| LPLLEX72A   | 412   | 215   | 682    | 0      | 7                 | 6    | 17    | 0.000223                     | 0.000205 | 0.00112  | 0.00156               | 0.00123  | 0.0191   |
| LPLBOX1     | 492   | 261   | 912    | 0      | 8                 | 7    | 4     | 0.000217                     | 0.000238 | 0.00294  | 0.00174               | 0.00166  | 0.0118   |
| LPLQUAL     | 1032  | 464   | 2355   | 0      | 61                | 55   | 51    | 0.000537                     | 0.000495 | 0.00259  | 0.0327                | 0.0272   | 0.132    |
| LPLREFINERY | 1032  | 464   | 2335   | 0      | 19                | 20   | 23    | 0.000533                     | 0.000469 | 0.00243  | 0.0101                | 0.00938  | 0.0558   |
| LPLVOL1     | 1032  | 464   | 2355   | 0      | 56                | 57   | 43    | 0.000539                     | 0.000499 | 0.0024   | 0.0302                | 0.0285   | 0.103    |
| LPLKLEIN2   | 1008  | 531   | 5593   | 0      | 14                | 16   | 41    | 0.000917                     | 0.000958 | 0.00219  | 0.0128                | 0.0153   | 0.09     |
| LPLBGDBG1   | 1022  | 629   | 2336   | 0      | 9                 | 8    | 9     | 0.00062                      | 0.000602 | 0.00432  | 0.00558               | 0.00481  | 0.0388   |
| LPLPANG     | 1117  | 741   | 3689   | 0      | 24                | 24   | 27    | 0.000852                     | 0.000788 | 0.00465  | 0.0205                | 0.0189   | 0.126    |
| LPLCHEMCOM  | 1176  | 744   | 2478   | 0      | 7                 | 8    | 7     | 0.000791                     | 0.000697 | 0.00525  | 0.00554               | 0.00557  | 0.0367   |
| LPLMONDOU2  | 1393  | 604   | 2289   | 0      | 1                 | 12   | 22    | 0.00196                      | 0.000402 | 0.00322  | 0.00196               | 0.00482  | 0.0709   |
| LPLBGETAM   | 1351  | 816   | 3488   | 0      | 7                 | 8    | 8     | 0.00206                      | 0.00189  | 0.00958  | 0.0144                | 0.0152   | 0.0766   |
| LPLREACTOR  | 1674  | 808   | 3947   | 0      | 29                | 29   | 22    | 0.000933                     | 0.000956 | 0.00695  | 0.0271                | 0.0277   | 0.153    |
| LPLPILOT4I  | 1692  | 1123  | 6546   | 0      | 27                | 30   | 23    | 0.00186                      | 0.00138  | 0.0104   | 0.0503                | 0.0413   | 0.238    |
| LPLKLEIN3   | 2076  | 1082  | 14183  | 0      | 18                | 17   | 28    | 0.00224                      | 0.00208  | 0.00477  | 0.0404                | 0.0354   | 0.134    |
| LPLGRAN     | 5707  | 2525  | 23160  | 0      | 10                | 13   | 46    | 0.00835                      | 0.00683  | 0.0128   | 0.0835                | 0.0887   | 0.591    |
| LPLCERIA3D  | 7152  | 4400  | 24754  | 0      | 15                | 11   | 10    | 0.00586                      | 0.00561  | 0.0557   | 0.0879                | 0.0618   | 0.557    |
| LPLCPLEX1   | 8447  | 5224  | 16389  | 0      | 6                 | 11   | 22    | 0.00679                      | 0.00279  | 0.0152   | 0.0407                | 0.0307   | 0.335    |
| LPLGREENBEA | 8290  | 5596  | 36971  | 0      | 29                | 32   | 17    | 0.0177                       | 0.0183   | 0.0371   | 0.513                 | 0.587    | 0.63     |
| LPLBGINDY   | 13551 | 10880 | 77146  | 0      | 7                 | 9    | 9     | 0.0377                       | 0.0294   | 0.072    | 0.264                 | 0.265    | 0.648    |
| LPLGOSH     | 17005 | 13455 | 113166 | 0      | 41                | 36   | 24    | 0.0498                       | 0.0459   | 0.0612   | 2.04                  | 1.65     | 1.47     |

Table 6: Solve times and iteration counts for the LP Optimal Power Flow problem set

| Problem               | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |          | total time (s) |          |         |
|-----------------------|-------|-------|--------|--------|------------|------|-------|-----------------------|----------|----------|----------------|----------|---------|
|                       |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek    | ClarabelRs     | ECOS     | Mosek   |
| CASE3_LMBD            | 25    | 9     | 43     | 2      | 8          | 18   | -     | 1.55e-05              | 1.27e-05 | -        | 0.000124       | 0.000229 | -       |
| CASE3_LMBD__API       | 25    | 9     | 43     | 2      | 8          | 16   | -     | 1.53e-05              | 1.58e-05 | -        | 0.000122       | 0.000254 | -       |
| CASE3_LMBD__SAD       | 25    | 9     | 43     | 2      | 8          | 18   | -     | 1.51e-05              | 1.59e-05 | -        | 0.000121       | 0.000286 | -       |
| CASE5_PJM             | 46    | 16    | 82     | 0      | 7          | 8    | 8     | 2.61e-05              | 2.52e-05 | 0.000194 | 0.000183       | 0.000202 | 0.00155 |
| CASE5_PJM__API        | 46    | 16    | 82     | 0      | 9          | 9    | 10    | 2.49e-05              | 3.01e-05 | 0.000186 | 0.000224       | 0.000271 | 0.00186 |
| CASE14_IEEE           | 125   | 39    | 236    | 0      | 7          | 7    | 7     | 6.64e-05              | 5.97e-05 | 0.000326 | 0.000465       | 0.000418 | 0.00228 |
| CASE14_IEEE__API      | 125   | 39    | 236    | 0      | 11         | 11   | 11    | 5.6e-05               | 6.03e-05 | 0.000248 | 0.000616       | 0.000663 | 0.00273 |
| CASE30_AS             | 248   | 77    | 470    | 6      | 8          | 16   | 15    | 9.86e-05              | 0.000131 | 0.000305 | 0.000789       | 0.0021   | 0.00457 |
| CASE30_AS__API        | 248   | 77    | 470    | 6      | 9          | 20   | 24    | 0.000103              | 0.000118 | 0.000305 | 0.000924       | 0.00236  | 0.00733 |
| CASE30_IEEE           | 248   | 77    | 470    | 0      | 8          | 8    | 8     | 0.000121              | 0.000114 | 0.00037  | 0.000966       | 0.000911 | 0.00296 |
| CASE30_IEEE__API      | 248   | 77    | 470    | 0      | 7          | 8    | 9     | 0.000127              | 0.000112 | 0.000346 | 0.000887       | 0.000894 | 0.00311 |
| CASE24_IEEE_RTS       | 273   | 95    | 502    | 22     | 9          | 22   | -     | 0.000108              | 0.00012  | -        | 0.000969       | 0.00263  | -       |
| CASE24_IEEE_RTS__API  | 273   | 95    | 502    | 22     | 11         | 23   | -     | 0.000101              | 0.000108 | -        | 0.00111        | 0.00247  | -       |
| CASE24_IEEE_RTS__SAD  | 273   | 95    | 502    | 22     | 12         | 27   | -     | 0.000102              | 0.00012  | -        | 0.00122        | 0.00325  | -       |
| CASE39_EPRI           | 290   | 95    | 537    | 0      | 9          | 9    | 13    | 0.000126              | 0.00012  | 0.000365 | 0.00113        | 0.00108  | 0.00474 |
| CASE39_EPRI__API      | 290   | 95    | 537    | 0      | 9          | 10   | 10    | 0.000131              | 0.000118 | 0.000401 | 0.00118        | 0.00118  | 0.00401 |
| CASE39_EPRI__SAD      | 290   | 95    | 537    | 0      | 18         | 20   | 13    | 0.000119              | 0.000122 | 0.000356 | 0.00215        | 0.00243  | 0.00463 |
| CASE57_IEEE           | 468   | 144   | 894    | 0      | 8          | 9    | 10    | 0.000217              | 0.000196 | 0.000506 | 0.00174        | 0.00177  | 0.00506 |
| CASE57_IEEE__API      | 468   | 144   | 894    | 0      | 10         | 12   | 11    | 0.000213              | 0.000194 | 0.000507 | 0.00213        | 0.00233  | 0.00558 |
| CASE60_C              | 515   | 171   | 974    | 0      | 8          | 8    | 9     | 0.00023               | 0.000237 | 0.000782 | 0.00184        | 0.00189  | 0.00704 |
| CASE60_C__API         | 515   | 171   | 974    | 0      | 14         | 19   | 13    | 0.000201              | 0.000198 | 0.000606 | 0.00282        | 0.00377  | 0.00788 |
| CASE73_IEEE_RTS       | 848   | 292   | 1570   | 66     | 9          | 25   | -     | 0.000337              | 0.000391 | -        | 0.00303        | 0.00977  | -       |
| CASE73_IEEE_RTS__API  | 848   | 292   | 1570   | 66     | 12         | 25   | -     | 0.000307              | 0.000349 | -        | 0.00368        | 0.00871  | -       |
| CASE73_IEEE_RTS__SAD  | 848   | 292   | 1570   | 66     | 13         | 47   | -     | 0.000301              | 0.000366 | -        | 0.00392        | 0.0172   | -       |
| CASE89_PEGASE         | 1156  | 311   | 2331   | 0      | 9          | 8    | 29    | 0.000526              | 0.000513 | 0.00201  | 0.00474        | 0.0041   | 0.0582  |
| CASE89_PEGASE__API    | 1156  | 311   | 2331   | 0      | 14         | 14   | 35    | 0.000601              | 0.000529 | 0.002    | 0.00841        | 0.00741  | 0.0701  |
| CASE118_IEEE          | 1143  | 358   | 2181   | 0      | 12         | 12   | 12    | 0.000492              | 0.000485 | 0.00226  | 0.00591        | 0.00583  | 0.0271  |
| CASE118_IEEE__API     | 1143  | 358   | 2181   | 0      | 14         | 14   | 16    | 0.000554              | 0.00059  | 0.00214  | 0.00776        | 0.00826  | 0.0342  |
| CASE179_GOC           | 1471  | 471   | 2817   | 0      | 13         | 12   | 18    | 0.000559              | 0.000546 | 0.0026   | 0.00727        | 0.00656  | 0.0468  |
| CASE179_GOC__API      | 1471  | 471   | 2817   | 0      | 13         | 13   | 23    | 0.000632              | 0.000714 | 0.00255  | 0.00822        | 0.00928  | 0.0586  |
| CASE200_ACTIV         | 1502  | 483   | 2810   | 31     | 10         | 21   | 16    | 0.000567              | 0.000735 | 0.00371  | 0.00567        | 0.0154   | 0.0593  |
| CASE200_ACTIV__API    | 1502  | 483   | 2810   | 31     | 11         | 19   | 26    | 0.000571              | 0.000807 | 0.00308  | 0.00628        | 0.0153   | 0.0801  |
| CASE162_IEEE_DTC      | 1599  | 458   | 3145   | 0      | 14         | 14   | 18    | 0.000739              | 0.000782 | 0.00309  | 0.0104         | 0.0109   | 0.0557  |
| CASE162_IEEE_DTC__API | 1599  | 458   | 3145   | 0      | 16         | 14   | 16    | 0.000769              | 0.000835 | 0.00312  | 0.0123         | 0.0117   | 0.0499  |
| CASE162_IEEE_DTC__SAD | 1599  | 458   | 3145   | 0      | 18         | 19   | 16    | 0.000746              | 0.000851 | 0.00316  | 0.0134         | 0.0162   | 0.0506  |
| CASE197_SNEM          | 1572  | 518   | 3000   | 0      | 9          | 10   | 9     | 0.000645              | 0.000604 | 0.00332  | 0.0058         | 0.00604  | 0.0299  |
| CASE197_SNEM__API     | 1572  | 518   | 3000   | 0      | 12         | 13   | 16    | 0.000684              | 0.0007   | 0.00268  | 0.00821        | 0.0091   | 0.0428  |
| CASE300_IEEE          | 2490  | 780   | 4721   | 0      | 12         | 13   | 18    | 0.00114               | 0.0012   | 0.00416  | 0.0136         | 0.0156   | 0.075   |
| CASE300_IEEE__API     | 2490  | 780   | 4721   | 0      | 14         | 13   | 16    | 0.00124               | 0.00127  | 0.0044   | 0.0173         | 0.0165   | 0.0704  |
| CASE300_IEEE__SAD     | 2490  | 780   | 4721   | 0      | 14         | 16   | 19    | 0.0013                | 0.00121  | 0.00481  | 0.0182         | 0.0193   | 0.0914  |
| CASE240_PSERC         | 2567  | 831   | 4958   | 0      | 13         | 14   | 23    | 0.00142               | 0.00133  | 0.00496  | 0.0184         | 0.0186   | 0.114   |
| CASE240_PSERC__API    | 2567  | 831   | 4958   | 0      | 12         | 12   | 14    | 0.00129               | 0.00146  | 0.00527  | 0.0155         | 0.0175   | 0.0738  |
| CASE588_SDET          | 4191  | 1369  | 7796   | 0      | 14         | 13   | 14    | 0.00216               | 0.00264  | 0.00722  | 0.0302         | 0.0343   | 0.101   |
| CASE588_SDET__API     | 4191  | 1369  | 7796   | 0      | 13         | 12   | 13    | 0.00232               | 0.00244  | 0.00753  | 0.0302         | 0.0292   | 0.0979  |
| CASE500_GOC           | 4327  | 1399  | 8210   | 60     | 15         | 22   | -     | 0.00174               | 0.00185  | -        | 0.0261         | 0.0407   | -       |
| CASE500_GOC__API      | 4327  | 1399  | 8210   | 60     | 18         | 33   | -     | 0.00167               | 0.00184  | -        | 0.0301         | 0.0608   | -       |

Table 6: Solve times and iteration counts for the LP Optimal Power Flow problem set

| Problem              | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |         |        | total time (s) |        |       |
|----------------------|-------|-------|--------|--------|------------|------|-------|-----------------------|---------|--------|----------------|--------|-------|
|                      |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS    | Mosek  | ClarabelRs     | ECOS   | Mosek |
| CASE793_GOC          | 5535  | 1803  | 10299  | 48     | 16         | 28   | -     | 0.00224               | 0.00277 | -      | 0.0358         | 0.0776 | -     |
| CASE793_GOC__API     | 5535  | 1803  | 10299  | 48     | 15         | 35   | -     | 0.0022                | 0.0028  | -      | 0.0331         | 0.0981 | -     |
| CASE1354_PEGASE      | 11268 | 3605  | 21558  | 0      | 13         | 13   | 28    | 0.00533               | 0.00671 | 0.0197 | 0.0693         | 0.0872 | 0.551 |
| CASE1354_PEGASE__API | 11268 | 3605  | 21558  | 0      | 14         | 14   | 27    | 0.00603               | 0.00734 | 0.0198 | 0.0844         | 0.103  | 0.534 |
| CASE1888_RTE         | 14678 | 4709  | 27820  | 0      | 12         | 13   | 36    | 0.00737               | 0.00827 | 0.023  | 0.0884         | 0.108  | 0.83  |
| CASE1888_RTE__API    | 14678 | 4709  | 27820  | 0      | 16         | 16   | 32    | 0.00755               | 0.00804 | 0.0242 | 0.121          | 0.129  | 0.773 |
| CASE1888_RTE__SAD    | 14678 | 4709  | 27820  | 0      | 13         | 13   | 25    | 0.00708               | 0.00901 | 0.0242 | 0.0921         | 0.117  | 0.606 |
| CASE1803_SNEM        | 15041 | 4828  | 29036  | 0      | 17         | 18   | 32    | 0.00734               | 0.00927 | 0.0241 | 0.125          | 0.167  | 0.771 |
| CASE1803_SNEM__API   | 15041 | 4828  | 29036  | 0      | 20         | 30   | 39    | 0.00818               | 0.00713 | 0.024  | 0.164          | 0.214  | 0.935 |
| CASE1951_RTE         | 15222 | 4913  | 28771  | 0      | 14         | 14   | 33    | 0.00724               | 0.0097  | 0.0246 | 0.101          | 0.136  | 0.811 |
| CASE1951_RTE__API    | 15222 | 4913  | 28771  | 0      | 17         | 17   | 36    | 0.00882               | 0.00788 | 0.0257 | 0.15           | 0.134  | 0.926 |
| CASE2312_GOC         | 17464 | 5551  | 33090  | 42     | 22         | 27   | -     | 0.0076                | 0.00911 | -      | 0.167          | 0.246  | -     |
| CASE2312_GOC__API    | 17464 | 5551  | 33090  | 42     | 18         | 62   | -     | 0.00764               | 0.00818 | -      | 0.138          | 0.507  | -     |
| CASE2383WP_K         | 17498 | 5606  | 32798  | 0      | 21         | 23   | 25    | 0.0104                | 0.0102  | 0.0294 | 0.219          | 0.235  | 0.734 |
| CASE2383WP_K__API    | 17498 | 5606  | 32798  | 0      | 12         | 10   | 13    | 0.0088                | 0.0119  | 0.0401 | 0.106          | 0.119  | 0.522 |
| CASE2000_GOC         | 18988 | 5871  | 37370  | 122    | 14         | 36   | -     | 0.00782               | 0.00847 | -      | 0.109          | 0.305  | -     |
| CASE2000_GOC__API    | 18988 | 5871  | 37370  | 122    | 18         | 37   | -     | 0.00797               | 0.00844 | -      | 0.143          | 0.312  | -     |
| CASE2737SOP_K        | 19509 | 6225  | 36593  | 0      | 16         | 18   | 20    | 0.0105                | 0.0137  | 0.036  | 0.168          | 0.247  | 0.719 |
| CASE2737SOP_K__API   | 19509 | 6225  | 36593  | 0      | 15         | 17   | 25    | 0.0107                | 0.0139  | 0.0332 | 0.161          | 0.236  | 0.83  |
| CASE2736SP_K         | 19610 | 6275  | 36746  | 0      | 13         | 13   | 23    | 0.01                  | 0.0125  | 0.0351 | 0.13           | 0.163  | 0.807 |
| CASE2736SP_K__API    | 19610 | 6275  | 36746  | 0      | 19         | 23   | 23    | 0.0117                | 0.0124  | 0.0345 | 0.222          | 0.285  | 0.793 |
| CASE2746WP_K         | 20042 | 6481  | 37414  | 0      | 15         | 17   | 27    | 0.0103                | 0.013   | 0.0351 | 0.154          | 0.221  | 0.947 |
| CASE2746WP_K__API    | 20042 | 6481  | 37414  | 0      | 25         | 20   | 26    | 0.00833               | 0.0108  | 0.0358 | 0.208          | 0.215  | 0.93  |
| CASE2746WOP_K        | 20128 | 6484  | 37639  | 0      | 14         | 15   | 23    | 0.0106                | 0.0138  | 0.0362 | 0.149          | 0.207  | 0.833 |
| CASE2746WOP_K__API   | 20128 | 6484  | 37639  | 0      | 18         | 20   | 22    | 0.0122                | 0.0111  | 0.0361 | 0.22           | 0.222  | 0.794 |
| CASE3012WP_K         | 21631 | 6969  | 40424  | 0      | 16         | 20   | 25    | 0.0135                | 0.0131  | 0.0378 | 0.215          | 0.262  | 0.945 |
| CASE3012WP_K__API    | 21631 | 6969  | 40424  | 0      | 24         | 37   | 27    | 0.013                 | 0.0101  | 0.0381 | 0.312          | 0.375  | 1.03  |
| CASE2848_RTE         | 22083 | 7135  | 41734  | 0      | 13         | 13   | 32    | 0.0109                | 0.0123  | 0.0362 | 0.142          | 0.16   | 1.16  |
| CASE2848_RTE__API    | 22083 | 7135  | 41734  | 0      | 15         | 16   | 26    | 0.0112                | 0.0127  | 0.0384 | 0.168          | 0.204  | 0.999 |
| CASE3120SP_K         | 22164 | 7111  | 41482  | 0      | 17         | 18   | 27    | 0.0132                | 0.0128  | 0.0376 | 0.225          | 0.231  | 1.02  |
| CASE3120SP_K__API    | 22164 | 7111  | 41482  | 0      | 17         | 26   | 26    | 0.0138                | 0.0117  | 0.0391 | 0.235          | 0.304  | 1.02  |
| CASE2868_RTE         | 22357 | 7237  | 42224  | 0      | 14         | 15   | 29    | 0.0112                | 0.0157  | 0.0373 | 0.156          | 0.235  | 1.08  |
| CASE2868_RTE__API    | 22357 | 7237  | 42224  | 0      | 17         | 16   | 34    | 0.012                 | 0.0128  | 0.0373 | 0.204          | 0.204  | 1.27  |
| CASE2853_SDET        | 23525 | 7593  | 44445  | 0      | 19         | 20   | 24    | 0.0117                | 0.0127  | 0.0368 | 0.223          | 0.255  | 0.884 |
| CASE2853_SDET__API   | 23525 | 7593  | 44445  | 0      | 41         | -    | 49    | 0.00887               | -       | 0.0359 | 0.364          | -      | 1.76  |
| CASE3022_GOC         | 23816 | 7484  | 45395  | 110    | 22         | 40   | -     | 0.0114                | 0.013   | -      | 0.251          | 0.521  | -     |
| CASE3022_GOC__API    | 23816 | 7484  | 45395  | 110    | 23         | 73   | 55    | 0.00994               | 0.0111  | 0.0486 | 0.229          | 0.809  | 2.67  |
| CASE3022_GOC__SAD    | 23816 | 7484  | 45395  | 110    | 22         | 43   | -     | 0.0115                | 0.0126  | -      | 0.253          | 0.542  | -     |
| CASE2742_GOC         | 25136 | 7597  | 49278  | 48     | 15         | 56   | -     | 0.0114                | 0.0119  | -      | 0.171          | 0.665  | -     |
| CASE2742_GOC__API    | 25136 | 7597  | 49278  | 48     | 19         | 74   | -     | 0.0117                | 0.0129  | -      | 0.223          | 0.952  | -     |
| CASE2742_GOC__SAD    | 25136 | 7597  | 49278  | 48     | 15         | 62   | -     | 0.0117                | 0.0107  | -      | 0.176          | 0.666  | -     |
| CASE3375WP_K         | 24952 | 8014  | 46837  | 0      | 16         | 15   | 27    | 0.0132                | 0.0184  | 0.0432 | 0.212          | 0.276  | 1.17  |
| CASE3375WP_K__API    | 24952 | 8014  | 46837  | 0      | 18         | 19   | 38    | 0.0142                | 0.0133  | 0.0426 | 0.256          | 0.252  | 1.62  |
| CASE3375WP_K__SAD    | 24952 | 8014  | 46837  | 0      | 17         | 16   | 30    | 0.0139                | 0.0164  | 0.0416 | 0.236          | 0.263  | 1.25  |
| CASE2869_PEGASE      | 25572 | 7961  | 49477  | 0      | 16         | 15   | 38    | 0.0119                | 0.0173  | 0.0394 | 0.19           | 0.26   | 1.5   |
| CASE2869_PEGASE__API | 25572 | 7961  | 49477  | 0      | 16         | 16   | 37    | 0.0134                | 0.02    | 0.0404 | 0.215          | 0.32   | 1.5   |

Table 6: Solve times and iteration counts for the LP Optimal Power Flow problem set

| Problem                 | vars.  | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |        |        | total time (s) |       |       |
|-------------------------|--------|-------|--------|--------|------------|------|-------|-----------------------|--------|--------|----------------|-------|-------|
|                         |        |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS   | Mosek  | ClarabelRs     | ECOS  | Mosek |
| CASE4661_SDET           | 35603  | 11382 | 67156  | 0      | 17         | 20   | 27    | 0.0269                | 0.0245 | 0.0566 | 0.457          | 0.49  | 1.53  |
| CASE4661_SDET__API      | 35603  | 11382 | 67156  | 0      | 17         | 31   | 35    | 0.0246                | 0.0199 | 0.06   | 0.419          | 0.618 | 2.1   |
| CASE3970_GOC            | 36084  | 10994 | 70485  | 65     | 15         | 67   | -     | 0.0163                | 0.0244 | -      | 0.244          | 1.64  | -     |
| CASE3970_GOC__API       | 36084  | 10994 | 70485  | 65     | 18         | -    | -     | 0.0169                | -      | -      | 0.304          | -     | -     |
| CASE4020_GOC            | 37867  | 11360 | 74329  | 23     | 26         | 36   | 40    | 0.0179                | 0.0244 | 0.0669 | 0.466          | 0.879 | 2.67  |
| CASE4020_GOC__API       | 37867  | 11360 | 74329  | 23     | 20         | -    | -     | 0.0195                | -      | -      | 0.389          | -     | -     |
| CASE4917_GOC            | 38604  | 12210 | 73532  | 193    | 21         | 69   | -     | 0.0215                | 0.0174 | -      | 0.451          | 1.2   | -     |
| CASE4917_GOC__API       | 38604  | 12210 | 73532  | 193    | 22         | -    | -     | 0.017                 | -      | -      | 0.375          | -     | -     |
| CASE4917_GOC__SAD       | 38604  | 12210 | 73532  | 193    | 22         | 68   | -     | 0.018                 | 0.0178 | -      | 0.396          | 1.21  | -     |
| CASE4601_GOC            | 39625  | 12208 | 76838  | 62     | 16         | 75   | -     | 0.0176                | 0.0231 | -      | 0.282          | 1.73  | -     |
| CASE4601_GOC__API       | 39625  | 12208 | 76838  | 62     | 19         | -    | -     | 0.0186                | -      | -      | 0.354          | -     | -     |
| CASE4601_GOC__SAD       | 39625  | 12208 | 76838  | 62     | 21         | -    | -     | 0.0204                | -      | -      | 0.429          | -     | -     |
| CASE4837_GOC            | 42041  | 12934 | 81840  | 50     | 17         | 51   | -     | 0.0199                | 0.0236 | -      | 0.339          | 1.2   | -     |
| CASE4837_GOC__API       | 42041  | 12934 | 81840  | 50     | 21         | 67   | -     | 0.0188                | 0.0211 | -      | 0.395          | 1.42  | -     |
| CASE4619_GOC            | 44438  | 13116 | 87440  | 29     | 18         | 53   | -     | 0.0209                | 0.0222 | -      | 0.375          | 1.18  | -     |
| CASE4619_GOC__API       | 44438  | 13116 | 87440  | 29     | 20         | -    | -     | 0.0243                | -      | -      | 0.486          | -     | -     |
| CASE5658_EPIGRIDS       | 49549  | 15204 | 96379  | 0      | 17         | 16   | 39    | 0.0265                | 0.0376 | 0.0732 | 0.451          | 0.602 | 2.85  |
| CASE5658_EPIGRIDS__API  | 49549  | 15204 | 96379  | 0      | 14         | 16   | 40    | 0.0297                | 0.0384 | 0.074  | 0.416          | 0.615 | 2.96  |
| CASE6468_RTE            | 50397  | 15867 | 96458  | 0      | 15         | 16   | 61    | 0.0275                | 0.0347 | 0.0686 | 0.412          | 0.556 | 4.18  |
| CASE6468_RTE__API       | 50397  | 15867 | 96458  | 0      | 18         | 18   | 55    | 0.0274                | 0.0359 | 0.0659 | 0.494          | 0.646 | 3.62  |
| CASE6468_RTE__SAD       | 50397  | 15867 | 96458  | 0      | 15         | 17   | 61    | 0.0272                | 0.0368 | 0.0673 | 0.408          | 0.626 | 4.1   |
| CASE6495_RTE            | 51081  | 16194 | 97510  | 0      | 18         | 19   | 70    | 0.0271                | 0.0474 | 0.0731 | 0.487          | 0.9   | 5.11  |
| CASE6495_RTE__API       | 51081  | 16194 | 97510  | 0      | 17         | 18   | 58    | 0.03                  | 0.0311 | 0.0734 | 0.509          | 0.56  | 4.26  |
| CASE6495_RTE__SAD       | 51081  | 16194 | 97510  | 0      | 18         | 19   | 65    | 0.0264                | 0.0393 | 0.0745 | 0.475          | 0.747 | 4.84  |
| CASE6470_RTE            | 51140  | 16236 | 97583  | 0      | 16         | 16   | 48    | 0.0272                | 0.0479 | 0.0702 | 0.435          | 0.767 | 3.37  |
| CASE6470_RTE__API       | 51140  | 16236 | 97583  | 0      | 16         | 16   | 40    | 0.0298                | 0.0309 | 0.0736 | 0.477          | 0.495 | 2.94  |
| CASE6470_RTE__SAD       | 51140  | 16236 | 97583  | 0      | 16         | 16   | 45    | 0.0271                | 0.0495 | 0.0704 | 0.434          | 0.792 | 3.17  |
| CASE6515_RTE            | 51203  | 16236 | 97728  | 0      | 18         | 20   | 58    | 0.0305                | 0.0362 | 0.0673 | 0.549          | 0.723 | 3.9   |
| CASE6515_RTE__API       | 51203  | 16236 | 97728  | 0      | 18         | 18   | 49    | 0.0314                | 0.0263 | 0.0696 | 0.565          | 0.474 | 3.41  |
| CASE6515_RTE__SAD       | 51203  | 16236 | 97728  | 0      | 18         | 19   | 58    | 0.0294                | 0.0359 | 0.0697 | 0.53           | 0.683 | 4.04  |
| CASE7336_EPIGRIDS       | 63100  | 19539 | 122362 | 0      | 16         | 18   | 37    | 0.0365                | 0.0507 | 0.0962 | 0.585          | 0.913 | 3.56  |
| CASE7336_EPIGRIDS__API  | 63100  | 19539 | 122362 | 0      | 17         | 19   | 40    | 0.0465                | 0.0457 | 0.0996 | 0.791          | 0.868 | 3.99  |
| CASE10000_GOC           | 79096  | 25209 | 149368 | 511    | 25         | 44   | -     | 0.0369                | 0.0513 | -      | 0.923          | 2.26  | -     |
| CASE10000_GOC__API      | 79096  | 25209 | 149368 | 511    | 25         | -    | -     | 0.0385                | -      | -      | 0.963          | -     | -     |
| CASE8387_PEGASE         | 81791  | 24813 | 159503 | 0      | 23         | 27   | 31    | 0.0561                | 0.0751 | 0.159  | 1.29           | 2.03  | 4.93  |
| CASE8387_PEGASE__API    | 81791  | 24813 | 159503 | 0      | 23         | 26   | 35    | 0.0579                | 0.0575 | 0.14   | 1.33           | 1.49  | 4.9   |
| CASE8387_PEGASE__SAD    | 81791  | 24813 | 159503 | 0      | 23         | 31   | 32    | 0.0575                | 0.0675 | 0.145  | 1.32           | 2.09  | 4.64  |
| CASE9591_GOC            | 86151  | 25871 | 168669 | 55     | 20         | -    | -     | 0.0486                | -      | -      | 0.972          | -     | -     |
| CASE9591_GOC__API       | 86151  | 25871 | 168669 | 55     | 24         | -    | -     | 0.0519                | -      | -      | 1.25           | -     | -     |
| CASE9241_PEGASE         | 88693  | 26735 | 173507 | 0      | 108        | -    | 71    | 0.0347                | -      | 0.152  | 3.75           | -     | 10.8  |
| CASE9241_PEGASE__API    | 88693  | 26735 | 173507 | 0      | 19         | 19   | 57    | 0.0557                | 0.0742 | 0.15   | 1.06           | 1.41  | 8.54  |
| CASE10192_EPIGRIDS      | 92051  | 27914 | 180020 | 697    | 18         | 63   | -     | 0.052                 | 0.0656 | -      | 0.935          | 4.14  | -     |
| CASE10192_EPIGRIDS__API | 92051  | 27914 | 180020 | 697    | 18         | 80   | -     | 0.0502                | 0.057  | -      | 0.904          | 4.56  | -     |
| CASE10480_GOC           | 99926  | 29816 | 196673 | 276    | 21         | 82   | -     | 0.0591                | 0.0755 | -      | 1.24           | 6.19  | -     |
| CASE10480_GOC__API      | 99926  | 29816 | 196673 | 276    | 19         | -    | -     | 0.0605                | -      | -      | 1.15           | -     | -     |
| CASE13659_PEGASE        | 120495 | 38218 | 230046 | 0      | 126        | -    | 43    | 0.0473                | -      | 0.216  | 5.96           | -     | 9.3   |

**Table 6: Solve times and iteration counts for the LP Optimal Power Flow problem set**

| Problem                 | vars.  | cons.  | nnz(A)  | nnz(P) | <u>iterations</u> |      |       | <u>time per iteration(s)</u> |        |       | <u>total time (s)</u> |      |       |
|-------------------------|--------|--------|---------|--------|-------------------|------|-------|------------------------------|--------|-------|-----------------------|------|-------|
|                         |        |        |         |        | ClarabelRs        | ECOS | Mosek | ClarabelRs                   | ECOS   | Mosek | ClarabelRs            | ECOS | Mosek |
| CASE13659_PEGASE__API   | 120495 | 38218  | 230046  | 0      | 45                | 54   | 37    | 0.0526                       | 0.0754 | 0.214 | 2.37                  | 4.07 | 7.91  |
| CASE20758_EPIGRIDS      | 182928 | 56275  | 355508  | 1881   | 19                | 53   | -     | 0.123                        | 0.16   | -     | 2.34                  | 8.46 | -     |
| CASE20758_EPIGRIDS__API | 182928 | 56275  | 355508  | 1881   | 19                | 70   | -     | 0.118                        | 0.149  | -     | 2.24                  | 10.4 | -     |
| CASE19402_GOC__SAD      | 184959 | 55077  | 364846  | 249    | 23                | -    | -     | 0.127                        | -      | -     | 2.93                  | -    | -     |
| CASE30000_GOC           | 213698 | 68919  | 399262  | 372    | 39                | 51   | -     | 0.118                        | 0.154  | -     | 4.59                  | 7.87 | -     |
| CASE30000_GOC__API      | 213698 | 68919  | 399262  | 372    | 31                | 95   | -     | 0.13                         | 0.152  | -     | 4.02                  | 14.5 | -     |
| CASE30000_GOC__SAD      | 213698 | 68919  | 399262  | 372    | 26                | -    | -     | 0.119                        | -      | -     | 3.1                   | -    | -     |
| CASE78484_EPIGRIDS      | 685984 | 211266 | 1334253 | 0      | 30                | -    | -     | 0.906                        | -      | -     | 27.2                  | -    | -     |
| CASE78484_EPIGRIDS__API | 685984 | 211266 | 1334253 | 0      | 27                | -    | 122   | 0.919                        | -      | 2.29  | 24.8                  | -    | 280   |
| CASE78484_EPIGRIDS__SAD | 685984 | 211266 | 1334253 | 0      | 31                | -    | -     | 0.9                          | -      | -     | 27.9                  | -    | -     |

Table 7: Solve times and iteration counts for the SOCP Optimal Power Flow problem set

| Problem              | vars. | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |          | total time (s) |          |         |
|----------------------|-------|-------|--------|--------|------------|------|-------|-----------------------|----------|----------|----------------|----------|---------|
|                      |       |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek    | ClarabelRs     | ECOS     | Mosek   |
| CASE3_LMBD           | 124   | 29    | 190    | 0      | 13         | 15   | 15    | 5.42e-05              | 5.95e-05 | 0.000252 | 0.000705       | 0.000893 | 0.00378 |
| CASE3_LMBD__API      | 124   | 29    | 190    | 0      | 13         | 14   | 14    | 5.68e-05              | 6.21e-05 | 0.000255 | 0.000739       | 0.00087  | 0.00357 |
| CASE3_LMBD__SAD      | 124   | 29    | 190    | 0      | 13         | 16   | 14    | 5.3e-05               | 5.95e-05 | 0.00026  | 0.000688       | 0.000952 | 0.00364 |
| CASE5_PJM            | 220   | 51    | 352    | 0      | 16         | 19   | 27    | 9.52e-05              | 0.000116 | 0.000342 | 0.00152        | 0.0022   | 0.00924 |
| CASE5_PJM__API       | 220   | 51    | 352    | 0      | 17         | 20   | 29    | 0.000103              | 0.000123 | 0.000343 | 0.00175        | 0.00247  | 0.00996 |
| CASE5_PJM__SAD       | 220   | 51    | 352    | 0      | 14         | 18   | 22    | 0.0001                | 0.000135 | 0.00036  | 0.0014         | 0.00243  | 0.00793 |
| CASE14_IEEE          | 676   | 144   | 1069   | 0      | 14         | 18   | 28    | 0.000283              | 0.000359 | 0.00183  | 0.00396        | 0.00647  | 0.0512  |
| CASE14_IEEE__API     | 676   | 144   | 1069   | 0      | 16         | 26   | 31    | 0.000285              | 0.000395 | 0.00187  | 0.00456        | 0.0103   | 0.0578  |
| CASE14_IEEE__SAD     | 676   | 144   | 1069   | 0      | 17         | 22   | 31    | 0.000283              | 0.000363 | 0.00183  | 0.00482        | 0.00798  | 0.0566  |
| CASE30_IEEE          | 1374  | 288   | 2188   | 0      | 25         | 28   | 35    | 0.000629              | 0.000628 | 0.00335  | 0.0157         | 0.0176   | 0.117   |
| CASE30_IEEE__API     | 1374  | 288   | 2188   | 0      | 22         | 29   | 37    | 0.000653              | 0.000604 | 0.0034   | 0.0144         | 0.0175   | 0.126   |
| CASE30_IEEE__SAD     | 1374  | 288   | 2188   | 0      | -          | -    | 45    | -                     | -        | 0.00345  | -              | -        | 0.155   |
| CASE30_AS            | 1404  | 294   | 2218   | 0      | 21         | 25   | 32    | 0.000567              | 0.000843 | 0.00355  | 0.0119         | 0.0211   | 0.114   |
| CASE30_AS__API       | 1404  | 294   | 2218   | 0      | 25         | 31   | 40    | 0.000602              | 0.0007   | 0.00349  | 0.0151         | 0.0217   | 0.14    |
| CASE30_AS__SAD       | 1404  | 294   | 2218   | 0      | 19         | 28   | 46    | 0.000579              | 0.000954 | 0.00346  | 0.011          | 0.0267   | 0.159   |
| CASE24_IEEE_RTS      | 1430  | 332   | 2253   | 0      | 18         | 23   | 40    | 0.000661              | 0.000699 | 0.00367  | 0.0119         | 0.0161   | 0.147   |
| CASE24_IEEE_RTS__API | 1430  | 332   | 2253   | 0      | 19         | 23   | 40    | 0.00067               | 0.000723 | 0.00361  | 0.0127         | 0.0166   | 0.145   |
| CASE24_IEEE_RTS__SAD | 1430  | 332   | 2253   | 0      | 17         | 22   | 43    | 0.000648              | 0.000802 | 0.00363  | 0.011          | 0.0176   | 0.156   |
| CASE39_EPRI          | 1576  | 335   | 2506   | 0      | 24         | 36   | 53    | 0.000712              | 0.00112  | 0.00365  | 0.0171         | 0.0405   | 0.193   |
| CASE39_EPRI__API     | 1576  | 335   | 2506   | 0      | 25         | 40   | 53    | 0.000718              | 0.000899 | 0.00359  | 0.0179         | 0.0359   | 0.19    |
| CASE39_EPRI__SAD     | 1576  | 335   | 2506   | 0      | 28         | 42   | 61    | 0.000706              | 0.000771 | 0.00365  | 0.0198         | 0.0324   | 0.222   |
| CASE57_IEEE          | 2632  | 547   | 4171   | 0      | 23         | 30   | 43    | 0.00126               | 0.00129  | 0.00625  | 0.0289         | 0.0387   | 0.269   |
| CASE57_IEEE__API     | 2632  | 547   | 4171   | 0      | 22         | 29   | 41    | 0.00124               | 0.00133  | 0.00641  | 0.0273         | 0.0385   | 0.263   |
| CASE57_IEEE__SAD     | 2632  | 547   | 4171   | 0      | 26         | 37   | 58    | 0.00127               | 0.00115  | 0.00618  | 0.033          | 0.0426   | 0.358   |
| CASE60_C             | 2780  | 602   | 4310   | 0      | 21         | 27   | 38    | 0.00115               | 0.00143  | 0.00668  | 0.0242         | 0.0385   | 0.254   |
| CASE60_C__API        | 2780  | 602   | 4310   | 0      | 26         | 40   | -     | 0.00123               | 0.00158  | -        | 0.032          | 0.063    | -       |
| CASE60_C__SAD        | 2780  | 602   | 4310   | 0      | 24         | 31   | -     | 0.00128               | 0.00153  | -        | 0.0308         | 0.0474   | -       |
| CASE73_IEEE_RTS      | 4474  | 1033  | 7067   | 0      | 22         | 26   | 45    | 0.00203               | 0.00264  | 0.0113   | 0.0448         | 0.0685   | 0.51    |
| CASE73_IEEE_RTS__API | 4474  | 1033  | 7067   | 0      | 20         | -    | 43    | 0.00203               | -        | 0.0114   | 0.0407         | -        | 0.491   |
| CASE73_IEEE_RTS__SAD | 4474  | 1033  | 7067   | 0      | 19         | 25   | 47    | 0.00219               | 0.00229  | 0.011    | 0.0416         | 0.0573   | 0.516   |
| CASE118_IEEE         | 6184  | 1328  | 10052  | 0      | 24         | 29   | 63    | 0.00284               | 0.00384  | 0.0149   | 0.0683         | 0.111    | 0.939   |
| CASE118_IEEE__API    | 6184  | 1328  | 10052  | 0      | 23         | 28   | 62    | 0.00298               | 0.00303  | 0.0148   | 0.0686         | 0.0848   | 0.919   |
| CASE118_IEEE__SAD    | 6184  | 1328  | 10052  | 0      | 21         | 27   | 66    | 0.00312               | 0.00325  | 0.015    | 0.0655         | 0.0876   | 0.987   |
| CASE89_PEGASE        | 6656  | 1365  | 11100  | 0      | 38         | -    | -     | 0.0034                | -        | -        | 0.129          | -        | -       |
| CASE89_PEGASE__API   | 6656  | 1365  | 11100  | 0      | 35         | 40   | -     | 0.00336               | 0.00275  | -        | 0.118          | 0.11     | -       |
| CASE89_PEGASE__SAD   | 6656  | 1365  | 11100  | 0      | 50         | -    | -     | 0.00296               | -        | -        | 0.148          | -        | -       |
| CASE179_GOC          | 8230  | 1733  | 12996  | 0      | 25         | 26   | -     | 0.00413               | 0.00553  | -        | 0.103          | 0.144    | -       |
| CASE179_GOC__API     | 8230  | 1733  | 12996  | 0      | 54         | -    | -     | 0.00426               | -        | -        | 0.23           | -        | -       |
| CASE179_GOC__SAD     | 8230  | 1733  | 12996  | 0      | 25         | 27   | 77    | 0.00393               | 0.00583  | 0.0193   | 0.0983         | 0.158    | 1.49    |
| CASE200_ACTIV        | 8457  | 1777  | 13527  | 0      | 38         | 34   | 42    | 0.00381               | 0.00404  | 0.0194   | 0.145          | 0.137    | 0.815   |
| CASE200_ACTIV__API   | 8457  | 1777  | 13527  | 0      | 48         | -    | 67    | 0.00394               | -        | 0.0191   | 0.189          | -        | 1.28    |
| CASE200_ACTIV__SAD   | 8457  | 1777  | 13527  | 0      | 40         | 42   | -     | 0.00379               | 0.00395  | -        | 0.152          | 0.166    | -       |
| CASE197_SNEM         | 8752  | 1857  | 14224  | 0      | -          | -    | 25    | -                     | -        | 0.0221   | -              | -        | 0.551   |
| CASE197_SNEM__API    | 8752  | 1857  | 14224  | 0      | 32         | -    | 49    | 0.00403               | -        | 0.0204   | 0.129          | -        | 0.998   |
| CASE197_SNEM__SAD    | 8752  | 1857  | 14224  | 0      | -          | -    | 24    | -                     | -        | 0.02     | -              | -        | 0.48    |
| CASE162_IEEE_DTC     | 9168  | 1882  | 14920  | 0      | 48         | 54   | -     | 0.00449               | 0.00481  | -        | 0.215          | 0.26     | -       |

Table 7: Solve times and iteration counts for the SOCP Optimal Power Flow problem set

| Problem               | vars.  | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |         |        | total time (s) |       |       |
|-----------------------|--------|-------|--------|--------|------------|------|-------|-----------------------|---------|--------|----------------|-------|-------|
|                       |        |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS    | Mosek  | ClarabelRs     | ECOS  | Mosek |
| CASE162.IEEE_DTC__API | 9168   | 1882  | 14920  | 0      | 47         | 68   | 90    | 0.00464               | 0.00441 | 0.023  | 0.218          | 0.3   | 2.07  |
| CASE162.IEEE_DTC__SAD | 9168   | 1882  | 14920  | 0      | 46         | 59   | 95    | 0.00453               | 0.00472 | 0.0229 | 0.208          | 0.278 | 2.18  |
| CASE300.IEEE__API     | 13782  | 2900  | 21993  | 0      | 51         | -    | -     | 0.00576               | -       | -      | 0.294          | -     | -     |
| CASE300.IEEE__SAD     | 13782  | 2900  | 21993  | 0      | 85         | -    | -     | 0.00528               | -       | -      | 0.449          | -     | -     |
| CASE240.PSERC         | 13772  | 3014  | 22076  | 0      | 28         | 35   | -     | 0.00717               | 0.00575 | -      | 0.201          | 0.201 | -     |
| CASE240.PSERC__API    | 13772  | 3014  | 22076  | 0      | 26         | 39   | -     | 0.00745               | 0.00706 | -      | 0.194          | 0.275 | -     |
| CASE240.PSERC__SAD    | 13772  | 3014  | 22076  | 0      | 29         | 39   | -     | 0.00735               | 0.00583 | -      | 0.213          | 0.227 | -     |
| CASE588.SDET          | 23204  | 4876  | 37012  | 0      | 77         | -    | -     | 0.0093                | -       | -      | 0.716          | -     | -     |
| CASE588.SDET__API     | 23204  | 4876  | 37012  | 0      | 68         | -    | -     | 0.0103                | -       | -      | 0.699          | -     | -     |
| CASE588.SDET__SAD     | 23204  | 4876  | 37012  | 0      | 78         | -    | -     | 0.00965               | -       | -      | 0.753          | -     | -     |
| CASE500.GOC           | 23888  | 5114  | 38653  | 0      | 45         | -    | -     | 0.0137                | -       | -      | 0.616          | -     | -     |
| CASE500.GOC__API      | 23888  | 5114  | 38653  | 0      | 37         | -    | -     | 0.012                 | -       | -      | 0.445          | -     | -     |
| CASE500.GOC__SAD      | 23888  | 5114  | 38653  | 0      | 43         | -    | -     | 0.0136                | -       | -      | 0.584          | -     | -     |
| CASE793.GOC           | 31082  | 6495  | 49764  | 0      | 48         | -    | -     | 0.0136                | -       | -      | 0.654          | -     | -     |
| CASE793.GOC__API      | 31082  | 6495  | 49764  | 0      | 56         | -    | -     | 0.014                 | -       | -      | 0.782          | -     | -     |
| CASE1354.PEGASE       | 62814  | 13258 | 103260 | 0      | 99         | -    | -     | 0.0281                | -       | -      | 2.78           | -     | -     |
| CASE1354.PEGASE__API  | 62814  | 13258 | 103260 | 0      | 66         | -    | -     | 0.0327                | -       | -      | 2.16           | -     | -     |
| CASE1354.PEGASE__SAD  | 62814  | 13258 | 103260 | 0      | 85         | -    | -     | 0.0289                | -       | -      | 2.45           | -     | -     |
| CASE1888.RTE__API     | 81966  | 17208 | 131225 | 0      | 90         | -    | -     | 0.0384                | -       | -      | 3.46           | -     | -     |
| CASE1888.RTE__SAD     | 81966  | 17208 | 131225 | 0      | 65         | -    | -     | 0.049                 | -       | -      | 3.19           | -     | -     |
| CASE1951.RTE          | 84496  | 17817 | 134660 | 0      | 79         | -    | -     | 0.0486                | -       | -      | 3.84           | -     | -     |
| CASE1951.RTE__API     | 84496  | 17817 | 134660 | 0      | 72         | -    | -     | 0.053                 | -       | -      | 3.82           | -     | -     |
| CASE1951.RTE__SAD     | 84496  | 17817 | 134660 | 0      | 80         | -    | -     | 0.0478                | -       | -      | 3.83           | -     | -     |
| CASE1803.SNEM         | 84794  | 17835 | 138430 | 0      | 85         | -    | -     | 0.0389                | -       | -      | 3.3            | -     | -     |
| CASE2383WP_K__API     | 97600  | 20393 | 155950 | 0      | 22         | 32   | -     | 0.0692                | 0.0529  | -      | 1.52           | 1.69  | -     |
| CASE2383WP_K__SAD     | 97600  | 20393 | 155950 | 0      | 104        | -    | -     | 0.0479                | -       | -      | 4.98           | -     | -     |
| CASE2000.GOC          | 108628 | 22742 | 178538 | 0      | 53         | -    | -     | 0.0774                | -       | -      | 4.1            | -     | -     |
| CASE2000.GOC__API     | 108628 | 22742 | 178538 | 0      | 51         | -    | -     | 0.0699                | -       | -      | 3.57           | -     | -     |
| CASE2737SOP_K         | 109822 | 22777 | 176602 | 0      | 71         | -    | -     | 0.053                 | -       | -      | 3.76           | -     | -     |
| CASE2737SOP_K__API    | 109822 | 22777 | 176602 | 0      | 85         | -    | -     | 0.0491                | -       | -      | 4.18           | -     | -     |
| CASE2736SP_K          | 110022 | 22878 | 176901 | 0      | 71         | -    | -     | 0.0502                | -       | -      | 3.57           | -     | -     |
| CASE2736SP_K__SAD     | 110022 | 22878 | 176901 | 0      | 77         | -    | -     | 0.0521                | -       | -      | 4.01           | -     | -     |
| CASE2746WP_K__API     | 111106 | 23320 | 178556 | 0      | -          | -    | 36    | -                     | -       | 0.258  | -              | -     | 9.29  |
| CASE2746WP_K__SAD     | 111106 | 23320 | 178556 | 0      | 78         | -    | -     | 0.0505                | -       | -      | 3.94           | -     | -     |
| CASE2746WOP_K         | 111822 | 23434 | 179829 | 0      | 69         | -    | -     | 0.0563                | -       | -      | 3.89           | -     | -     |
| CASE2746WOP_K__SAD    | 111822 | 23434 | 179829 | 0      | 66         | -    | -     | 0.0524                | -       | -      | 3.46           | -     | -     |
| CASE3012WP_K          | 120676 | 25202 | 193907 | 0      | 111        | -    | -     | 0.0565                | -       | -      | 6.27           | -     | -     |
| CASE3012WP_K__SAD     | 120676 | 25202 | 193907 | 0      | 117        | -    | -     | 0.0563                | -       | -      | 6.58           | -     | -     |
| CASE2848.RTE          | 122708 | 25858 | 197228 | 0      | 81         | -    | -     | 0.0742                | -       | -      | 6.01           | -     | -     |
| CASE2848.RTE__API     | 122708 | 25858 | 197228 | 0      | 87         | -    | -     | 0.084                 | -       | -      | 7.31           | -     | -     |
| CASE2848.RTE__SAD     | 122708 | 25858 | 197228 | 0      | 70         | -    | -     | 0.0722                | -       | -      | 5.05           | -     | -     |
| CASE2868.RTE          | 123912 | 26164 | 198869 | 0      | 85         | -    | -     | 0.0796                | -       | -      | 6.77           | -     | -     |
| CASE2868.RTE__API     | 123912 | 26164 | 198869 | 0      | 77         | -    | -     | 0.0779                | -       | -      | 6              | -     | -     |
| CASE2868.RTE__SAD     | 123912 | 26164 | 198869 | 0      | 83         | -    | -     | 0.0757                | -       | -      | 6.28           | -     | -     |
| CASE2853.SDET__SAD    | 128886 | 27445 | 206896 | 0      | 105        | -    | -     | 0.0532                | -       | -      | 5.58           | -     | -     |
| CASE3375WP_K          | 139126 | 29112 | 223999 | 0      | 93         | -    | -     | 0.0595                | -       | -      | 5.54           | -     | -     |



Table 7: Solve times and iteration counts for the SOCP Optimal Power Flow problem set

| Problem                | vars.  | cons.  | nnz(A) | nnz(P) | <u>iterations</u> |      |       | <u>time per iteration(s)</u> |      |       | <u>total time (s)</u> |      |       |
|------------------------|--------|--------|--------|--------|-------------------|------|-------|------------------------------|------|-------|-----------------------|------|-------|
|                        |        |        |        |        | ClarabelRs        | ECOS | Mosek | ClarabelRs                   | ECOS | Mosek | ClarabelRs            | ECOS | Mosek |
| CASE3375WP_K__SAD      | 139126 | 29112  | 223999 | 0      | 110               | -    | -     | 0.0583                       | -    | -     | 6.42                  | -    | -     |
| CASE2869_PEGASE__API   | 143608 | 30153  | 236217 | 0      | 55                | -    | -     | 0.0994                       | -    | -     | 5.47                  | -    | -     |
| CASE2869_PEGASE__SAD   | 143608 | 30153  | 236217 | 0      | 52                | -    | -     | 0.102                        | -    | -     | 5.32                  | -    | -     |
| CASE2742_GOC           | 144110 | 29856  | 236467 | 0      | 113               | -    | -     | 0.103                        | -    | -     | 11.6                  | -    | -     |
| CASE2742_GOC__SAD      | 144110 | 29856  | 236467 | 0      | 109               | -    | -     | 0.102                        | -    | -     | 11.1                  | -    | -     |
| CASE4661_SDET__API     | 198498 | 41599  | 320728 | 0      | 131               | -    | -     | 0.107                        | -    | -     | 14                    | -    | -     |
| CASE3970_GOC           | 205819 | 42789  | 337328 | 0      | 142               | -    | -     | 0.143                        | -    | -     | 20.4                  | -    | -     |
| CASE4020_GOC           | 216455 | 44877  | 355706 | 0      | 197               | -    | -     | 0.154                        | -    | -     | 30.3                  | -    | -     |
| CASE4917_GOC__SAD      | 218213 | 45522  | 352833 | 0      | -                 | -    | 177   | -                            | -    | 0.458 | -                     | -    | 81    |
| CASE4601_GOC           | 225588 | 46885  | 368445 | 0      | 178               | -    | -     | 0.153                        | -    | -     | 27.2                  | -    | -     |
| CASE4601_GOC__SAD      | 225588 | 46885  | 368445 | 0      | 182               | -    | -     | 0.148                        | -    | -     | 26.9                  | -    | -     |
| CASE4837_GOC__SAD      | 240160 | 49855  | 392884 | 0      | 132               | -    | -     | 0.198                        | -    | -     | 26.1                  | -    | -     |
| CASE4619_GOC           | 254753 | 52616  | 419210 | 0      | 154               | -    | -     | 0.215                        | -    | -     | 33.1                  | -    | -     |
| CASE4619_GOC__SAD      | 254753 | 52616  | 419210 | 0      | 150               | -    | -     | 0.214                        | -    | -     | 32.1                  | -    | -     |
| CASE5658_EPIGRIDS      | 282180 | 58620  | 461724 | 0      | 162               | -    | -     | 0.222                        | -    | -     | 35.9                  | -    | -     |
| CASE5658_EPIGRIDS__API | 282180 | 58620  | 461724 | 0      | 165               | -    | -     | 0.261                        | -    | -     | 43.1                  | -    | -     |
| CASE5658_EPIGRIDS__SAD | 282180 | 58620  | 461724 | 0      | 160               | -    | -     | 0.216                        | -    | -     | 34.5                  | -    | -     |
| CASE6468_RTE__API      | 286248 | 59396  | 463599 | 0      | 91                | -    | -     | 0.22                         | -    | -     | 20                    | -    | -     |
| CASE6468_RTE__SAD      | 286248 | 59396  | 463599 | 0      | 101               | -    | -     | 0.208                        | -    | -     | 21                    | -    | -     |
| CASE6470_RTE           | 287806 | 60144  | 465757 | 0      | 115               | -    | -     | 0.201                        | -    | -     | 23.1                  | -    | -     |
| CASE6470_RTE__API      | 287806 | 60144  | 465757 | 0      | 89                | -    | -     | 0.222                        | -    | -     | 19.8                  | -    | -     |
| CASE6495_RTE           | 288050 | 60099  | 465939 | 0      | 124               | -    | -     | 0.195                        | -    | -     | 24.2                  | -    | -     |
| CASE6495_RTE__API      | 288050 | 60099  | 465939 | 0      | 111               | -    | -     | 0.197                        | -    | -     | 21.9                  | -    | -     |
| CASE6495_RTE__SAD      | 288050 | 60099  | 465939 | 0      | 112               | -    | -     | 0.193                        | -    | -     | 21.6                  | -    | -     |
| CASE6515_RTE__SAD      | 288710 | 60239  | 466922 | 0      | 93                | -    | -     | 0.207                        | -    | -     | 19.3                  | -    | -     |
| CASE7336_EPIGRIDS__API | 358450 | 74618  | 585766 | 0      | 151               | -    | -     | 0.333                        | -    | -     | 50.3                  | -    | -     |
| CASE10000_GOC__API     | 440997 | 92799  | 712177 | 0      | 67                | -    | -     | 0.392                        | -    | -     | 26.2                  | -    | -     |
| CASE10480_GOC__SAD     | 573754 | 118760 | 943278 | 0      | 166               | -    | -     | 0.548                        | -    | -     | 91                    | -    | -     |



Table 8: Solve times and iteration counts for the CBLIB Exponential Cone problem set

| Problem            | vars.  | cons. | nnz(A) | nnz(P) | iterations |      |       | time per iteration(s) |          |          | total time (s) |          |         |
|--------------------|--------|-------|--------|--------|------------|------|-------|-----------------------|----------|----------|----------------|----------|---------|
|                    |        |       |        |        | ClarabelRs | ECOS | Mosek | ClarabelRs            | ECOS     | Mosek    | ClarabelRs     | ECOS     | Mosek   |
| BSS1               | 14     | 11    | 23     | 0      | 8          | 14   | 9     | 1.28e-05              | 8.13e-06 | 0.000153 | 0.000102       | 0.000114 | 0.00138 |
| DEMB782            | 14     | 11    | 23     | 0      | 6          | 14   | 8     | 1.52e-05              | 7.99e-06 | 0.000154 | 9.1e-05        | 0.000112 | 0.00123 |
| BSS2               | 20     | 15    | 33     | 0      | 8          | 14   | 9     | 1.59e-05              | 1.07e-05 | 0.000158 | 0.000127       | 0.000149 | 0.00142 |
| DEMB781            | 26     | 19    | 40     | 0      | 10         | 16   | 7     | 1.72e-05              | 1.45e-05 | 0.000173 | 0.000172       | 0.000232 | 0.00121 |
| GPTEST             | 32     | 24    | 48     | 0      | 8          | 16   | 9     | 2.12e-05              | 1.5e-05  | 0.000168 | 0.00017        | 0.00024  | 0.00152 |
| RIJC781            | 32     | 24    | 48     | 0      | 8          | 16   | 9     | 2.15e-05              | 1.5e-05  | 0.000176 | 0.000172       | 0.00024  | 0.00158 |
| RIJC784            | 40     | 29    | 66     | 0      | 10         | 18   | 10    | 2.46e-05              | 2.25e-05 | 0.000186 | 0.000246       | 0.000404 | 0.00186 |
| RIJC785            | 44     | 33    | 83     | 0      | 10         | 17   | 9     | 2.77e-05              | 2.45e-05 | 0.000201 | 0.000277       | 0.000416 | 0.00181 |
| RIJC786            | 44     | 33    | 83     | 0      | 8          | 18   | 8     | 3.01e-05              | 2.38e-05 | 0.00021  | 0.000241       | 0.000428 | 0.00168 |
| RIJC782            | 56     | 40    | 87     | 0      | 12         | 17   | 11    | 3.13e-05              | 2.98e-05 | 0.00021  | 0.000376       | 0.000507 | 0.00231 |
| RIJC783            | 74     | 53    | 124    | 0      | 9          | 17   | 11    | 4.34e-05              | 3.84e-05 | 0.000232 | 0.00039        | 0.000653 | 0.00256 |
| BECK751            | 113    | 80    | 236    | 0      | 11         | 21   | 11    | 6.17e-05              | 5.58e-05 | 0.000271 | 0.000678       | 0.00117  | 0.00298 |
| BECK752            | 113    | 80    | 236    | 0      | 13         | 23   | 12    | 6e-05                 | 5.8e-05  | 0.000294 | 0.00078        | 0.00133  | 0.00352 |
| BECK753            | 113    | 80    | 236    | 0      | 11         | 22   | 11    | 6.16e-05              | 5.41e-05 | 0.00027  | 0.000677       | 0.00119  | 0.00297 |
| FIAC81B            | 122    | 87    | 201    | 0      | 13         | 25   | 13    | 6.23e-05              | 6.22e-05 | 0.000305 | 0.00081        | 0.00156  | 0.00396 |
| FANG88             | 165    | 119   | 252    | 0      | 14         | 24   | 14    | 8.06e-05              | 8.44e-05 | 0.00033  | 0.00113        | 0.00203  | 0.00462 |
| DEMB761            | 183    | 131   | 284    | 0      | 15         | 20   | 15    | 9.36e-05              | 9.3e-05  | 0.000352 | 0.0014         | 0.00186  | 0.00529 |
| DEMB762            | 183    | 131   | 284    | 0      | 14         | 22   | 14    | 9.1e-05               | 9.1e-05  | 0.000361 | 0.00127        | 0.002    | 0.00505 |
| DEMB763            | 183    | 131   | 284    | 0      | 15         | 20   | 14    | 8.68e-05              | 9.12e-05 | 0.000356 | 0.0013         | 0.00182  | 0.00499 |
| FIAC81A            | 289    | 191   | 496    | 0      | 13         | 22   | 10    | 0.000138              | 0.000138 | 0.000544 | 0.0018         | 0.00303  | 0.00544 |
| RIJC787            | 296    | 200   | 510    | 0      | 12         | 23   | 10    | 0.000143              | 0.000133 | 0.000567 | 0.00171        | 0.00306  | 0.00567 |
| CAR                | 865    | 601   | 1584   | 0      | 19         | 26   | 10    | 0.00041               | 0.000424 | 0.00193  | 0.00779        | 0.011    | 0.0193  |
| GP_DAVE_1          | 1441   | 705   | 3686   | 0      | 26         | 32   | 20    | 0.000683              | 0.000732 | 0.00438  | 0.0178         | 0.0234   | 0.0876  |
| JHA88              | 1691   | 1131  | 3005   | 0      | 14         | 24   | 13    | 0.000813              | 0.000736 | 0.00509  | 0.0114         | 0.0177   | 0.0662  |
| VARUN              | 2013   | 1346  | 6788   | 0      | 24         | 47   | 24    | 0.00131               | 0.00106  | 0.00562  | 0.0315         | 0.05     | 0.135   |
| GP_DAVE_2          | 2489   | 1219  | 6752   | 0      | 28         | 37   | 22    | 0.00129               | 0.00133  | 0.00731  | 0.0362         | 0.0493   | 0.161   |
| LogExpCR_N20_M400  | 3223   | 2022  | 13238  | 0      | 30         | 25   | 18    | 0.0017                | 0.00148  | 0.0061   | 0.0511         | 0.0369   | 0.11    |
| GP_DAVE_3          | 3537   | 1733  | 9818   | 0      | -          | 40   | 24    | -                     | 0.00198  | 0.0117   | -              | 0.0793   | 0.281   |
| LogExpCR_N100_M400 | 3303   | 2102  | 45314  | 0      | 31         | 27   | 19    | 0.00569               | 0.00508  | 0.00782  | 0.176          | 0.137    | 0.148   |
| MRA01              | 5513   | 3681  | 10680  | 0      | 25         | -    | 14    | 0.00271               | -        | 0.0173   | 0.0678         | -        | 0.242   |
| LogExpCR_N20_M800  | 6423   | 4022  | 26411  | 0      | 27         | 28   | 21    | 0.00352               | 0.00295  | 0.013    | 0.0951         | 0.0827   | 0.272   |
| LogExpCR_N100_M800 | 6503   | 4102  | 90322  | 0      | 34         | 30   | 23    | 0.0118                | 0.0107   | 0.0168   | 0.401          | 0.322    | 0.387   |
| LogExpCR_N20_M1200 | 9623   | 6022  | 39574  | 0      | 27         | 27   | 21    | 0.00561               | 0.00492  | 0.0193   | 0.151          | 0.133    | 0.406   |
| LogExpCR_N20_M1600 | 12823  | 8022  | 52729  | 0      | 28         | 29   | 20    | 0.00775               | 0.0105   | 0.0254   | 0.217          | 0.306    | 0.507   |
| LogExpCR_N20_M2000 | 16023  | 10022 | 65872  | 0      | 31         | 33   | 23    | 0.00994               | 0.0133   | 0.0314   | 0.308          | 0.44     | 0.721   |
| MRA02              | 21965  | 14606 | 50050  | 0      | 28         | -    | 17    | 0.0121                | -        | 0.0549   | 0.339          | -        | 0.933   |
| CX02_100           | 31087  | 20693 | 56430  | 0      | 19         | 28   | 13    | 0.0159                | 0.017    | 0.0822   | 0.301          | 0.477    | 1.07    |
| CX02_200           | 122187 | 81393 | 222880 | 0      | 22         | 35   | 13    | 0.0762                | 0.0887   | 0.36     | 1.68           | 3.11     | 4.68    |

**Table 9: Solve times and iteration counts for the CBLIB Second-Order Cone problem set**

| Problem             | vars.  | cons.  | nnz(A) | nnz(P) | <u>iterations</u> |      |       | <u>time per iteration(s)</u> |          |          | <u>total time (s)</u> |         |         |
|---------------------|--------|--------|--------|--------|-------------------|------|-------|------------------------------|----------|----------|-----------------------|---------|---------|
|                     |        |        |        |        | ClarabelRs        | ECOS | Mosek | ClarabelRs                   | ECOS     | Mosek    | ClarabelRs            | ECOS    | Mosek   |
| SAMBAL              | 63     | 31     | 87     | 0      | 11                | 14   | 13    | 3.12e-05                     | 3.36e-05 | 0.000231 | 0.000343              | 0.00047 | 0.00301 |
| NB                  | 2506   | 2383   | 193902 | 0      | 20                | -    | 12    | 0.0332                       | -        | 0.0113   | 0.664                 | -       | 0.136   |
| NB_L2_BESSEL        | 2764   | 2641   | 211458 | 0      | 10                | 17   | 7     | 0.0381                       | 0.0477   | 0.0145   | 0.381                 | 0.81    | 0.101   |
| NB_L1               | 4091   | 3176   | 195488 | 0      | 16                | 18   | 10    | 0.0355                       | 0.0363   | 0.0203   | 0.568                 | 0.653   | 0.203   |
| NQL30               | 6380   | 4501   | 20569  | 0      | 13                | 19   | 12    | 0.00795                      | 0.00841  | 0.0361   | 0.103                 | 0.16    | 0.434   |
| SCHED_50_50_SCALED  | 7503   | 4977   | 32962  | 0      | 19                | 29   | 18    | 0.00667                      | 0.00704  | 0.0128   | 0.127                 | 0.204   | 0.231   |
| SCHED_50_50_ORIG    | 7506   | 4979   | 30467  | 0      | -                 | -    | 28    | -                            | -        | 0.0133   | -                     | -       | 0.373   |
| CHAINSING_1000_3    | 10984  | 6991   | 18971  | 0      | 14                | 18   | 10    | 0.00558                      | 0.00642  | 0.0204   | 0.0781                | 0.116   | 0.204   |
| QSSP30              | 11255  | 7565   | 44414  | 0      | 16                | 18   | 13    | 0.012                        | 0.0145   | 0.0506   | 0.192                 | 0.26    | 0.658   |
| SCHED_100_50_SCALED | 14587  | 9744   | 70032  | 0      | 26                | 37   | 17    | 0.0152                       | 0.0135   | 0.0234   | 0.394                 | 0.498   | 0.399   |
| SCHED_100_50_ORIG   | 14590  | 9746   | 65037  | 0      | 33                | -    | -     | 0.0136                       | -        | -        | 0.448                 | -       | -       |
| CHAINSING_1000_2    | 14976  | 9985   | 25957  | 0      | 15                | 16   | 14    | 0.00646                      | 0.00868  | 0.0294   | 0.0968                | 0.139   | 0.411   |
| CHAINSING_1000_1    | 18964  | 12976  | 32936  | 0      | 9                 | 12   | 9     | 0.00829                      | 0.00928  | 0.0366   | 0.0746                | 0.111   | 0.33    |
| NQL60               | 25360  | 18001  | 82539  | 0      | 13                | 22   | 11    | 0.0459                       | 0.053    | 0.143    | 0.597                 | 1.17    | 1.57    |
| QSSP60              | 44105  | 29525  | 178814 | 0      | 18                | 22   | 16    | 0.0806                       | 0.12     | 0.195    | 1.45                  | 2.65    | 3.12    |
| NQL90               | 56940  | 40501  | 185909 | 0      | 15                | 22   | 11    | 0.17                         | 0.184    | 0.353    | 2.54                  | 4.06    | 3.89    |
| CHAINSING_10000_3   | 109984 | 69991  | 189971 | 0      | -                 | -    | 16    | -                            | -        | 0.218    | -                     | -       | 3.48    |
| CHAINSING_10000_2   | 149976 | 99985  | 259957 | 0      | 19                | -    | -     | 0.0852                       | -        | -        | 1.62                  | -       | -       |
| CHAINSING_10000_1   | 189964 | 129976 | 329936 | 0      | 10                | 12   | 9     | 0.104                        | 0.134    | 0.372    | 1.04                  | 1.6     | 3.35    |

Table 10: Solve times and iteration counts for the SDPLIB Semidefinite Programming problem set

| Problem   | vars. | cons. | nnz(A) | nnz(P) | iterations |       | time per iteration(s) |          | total time (s) |         |
|-----------|-------|-------|--------|--------|------------|-------|-----------------------|----------|----------------|---------|
|           |       |       |        |        | ClarabelRs | Mosek | ClarabelRs            | Mosek    | ClarabelRs     | Mosek   |
| TRUSS1    | 19    | 6     | 25     | 0      | 11         | 10    | 7.8e-05               | 0.00015  | 0.000858       | 0.0015  |
| TRUSS4    | 37    | 13    | 52     | 0      | 10         | 9     | 0.00014               | 0.000295 | 0.0014         | 0.00265 |
| HINF1     | 45    | 19    | 104    | 0      | 28         | -     | 0.000147              | -        | 0.00413        | -       |
| HINF4     | 55    | 19    | 130    | 0      | 24         | -     | 0.000176              | -        | 0.00422        | -       |
| HINF5     | 55    | 19    | 130    | 0      | 24         | -     | 0.000185              | -        | 0.00443        | -       |
| HINF6     | 55    | 19    | 130    | 0      | 23         | -     | 0.000182              | -        | 0.00419        | -       |
| HINF9     | 55    | 19    | 130    | 0      | 24         | -     | 0.000191              | -        | 0.00459        | -       |
| HINF10    | 72    | 31    | 210    | 0      | 26         | -     | 0.000253              | -        | 0.00658        | -       |
| CONTROL1  | 81    | 36    | 375    | 0      | 54         | -     | 0.000415              | -        | 0.0224         | -       |
| TRUSS3    | 89    | 28    | 120    | 0      | 12         | 10    | 0.000356              | 0.000609 | 0.00427        | 0.00609 |
| HINF11    | 106   | 46    | 447    | 0      | 25         | -     | 0.000465              | -        | 0.0116         | -       |
| HINF12    | 133   | 64    | 621    | 0      | 45         | -     | 0.00064               | -        | 0.0288         | -       |
| CONTROL2  | 265   | 66    | 2590   | 0      | 25         | -     | 0.00337               | -        | 0.0843         | -       |
| TRUSS2    | 298   | 124   | 699    | 0      | 14         | -     | 0.00121               | -        | 0.017          | -       |
| QAP5      | 351   | 136   | 1026   | 0      | 9          | 9     | 0.00672               | 0.0025   | 0.0605         | 0.0225  |
| TRUSS7    | 451   | 86    | 863    | 0      | 22         | 20    | 0.0016                | 0.00273  | 0.0353         | 0.0547  |
| CONTROL3  | 585   | 136   | 8610   | 0      | 29         | -     | 0.0129                | -        | 0.373          | -       |
| QAP6      | 703   | 229   | 1981   | 0      | 23         | -     | 0.0205                | -        | 0.47           | -       |
| TRUSS6    | 901   | 172   | 1726   | 0      | 25         | 22    | 0.00321               | 0.00816  | 0.0803         | 0.179   |
| CONTROL4  | 1030  | 231   | 20280  | 0      | 32         | -     | 0.0393                | -        | 1.26           | -       |
| THETA1    | 1275  | 104   | 153    | 0      | 12         | 8     | 0.0726                | 0.0255   | 0.871          | 0.204   |
| MCP124_1  | 886   | 563   | 1002   | 0      | 12         | 7     | 0.00396               | 2.09     | 0.0475         | 14.6    |
| QAP7      | 1275  | 358   | 3480   | 0      | 30         | -     | 0.0696                | -        | 2.09           | -       |
| CONTROL5  | 1600  | 351   | 39475  | 0      | 30         | -     | 0.104                 | -        | 3.11           | -       |
| TRUSS5    | 1816  | 208   | 2823   | 0      | 18         | 16    | 0.0336                | 0.0099   | 0.605          | 0.158   |
| QAP8      | 2145  | 529   | 5697   | 0      | 32         | -     | 0.22                  | -        | 7.03           | -       |
| CONTROL6  | 2295  | 496   | 68070  | 0      | 36         | -     | 0.223                 | -        | 8.03           | -       |
| MCP100    | 2274  | 1212  | 2324   | 0      | 11         | 7     | 0.0378                | 0.727    | 0.416          | 5.09    |
| CONTROL7  | 3115  | 666   | 107940 | 0      | 38         | -     | 0.449                 | -        | 17.1           | -       |
| MCP250_1  | 2774  | 1688  | 3126   | 0      | 12         | 9     | 0.0277                | 94.5     | 0.333          | 850     |
| MCP124_2  | 3077  | 1695  | 3266   | 0      | 11         | 8     | 0.0852                | 2.04     | 0.937          | 16.3    |
| CONTROL8  | 4060  | 861   | 160960 | 0      | 40         | -     | 0.844                 | -        | 33.8           | -       |
| GPP100    | 5050  | 101   | 5150   | 0      | 26         | -     | 1.66                  | -        | 43.2           | -       |
| THETA2    | 5050  | 498   | 597    | 0      | 10         | 9     | 1.78                  | 0.706    | 17.8           | 6.36    |
| QAP10     | 5151  | 1021  | 13101  | 0      | 25         | -     | 1.74                  | -        | 43.6           | -       |
| CONTROL9  | 5130  | 1081  | 229005 | 0      | 35         | -     | 1.49                  | -        | 52.2           | -       |
| TRUSS8    | 6271  | 496   | 8286   | 0      | -          | 14    | -                     | 0.0606   | -              | 0.849   |
| CONTROL10 | 6325  | 1326  | 313950 | 0      | 43         | -     | 2.4                   | -        | 103            | -       |
| GPP124_1  | 7750  | 125   | 7874   | 0      | 30         | -     | 4.74                  | -        | 142            | -       |
| GPP124_2  | 7750  | 125   | 7874   | 0      | 28         | 26    | 4.75                  | 1.82     | 133            | 47.4    |
| GPP124_3  | 7750  | 125   | 7874   | 0      | -          | 24    | -                     | 1.83     | -              | 43.9    |
| GPP124_4  | 7750  | 125   | 7874   | 0      | 33         | 28    | 4.64                  | 1.82     | 153            | 51      |
| MCP124_3  | 6115  | 2884  | 5644   | 0      | 14         | 8     | 0.439                 | 2.04     | 6.15           | 16.3    |
| ARCH2     | 6290  | 3060  | 9192   | 0      | 24         | -     | 0.14                  | -        | 3.36           | -       |
| ARCH4     | 6290  | 3060  | 9192   | 0      | 20         | -     | 0.143                 | -        | 2.85           | -       |
| ARCH8     | 6290  | 3060  | 9192   | 0      | 24         | -     | 0.139                 | -        | 3.35           | -       |

**Table 10: Solve times and iteration counts for the SDPLIB Semidefinite Programming problem set**

| Problem   | vars. | cons. | nnz(A) | nnz(P) | <u>iterations</u> |       | <u>time per iteration(s)</u> |       | <u>total time (s)</u> |       |
|-----------|-------|-------|--------|--------|-------------------|-------|------------------------------|-------|-----------------------|-------|
|           |       |       |        |        | ClarabelRs        | Mosek | ClarabelRs                   | Mosek | ClarabelRs            | Mosek |
| CONTROL11 | 8449  | 3136  | 420750 | 0      | 40                | -     | 3.9                          | -     | 156                   | -     |
| ARCH0     | 8188  | 4061  | 10804  | 0      | 22                | -     | 0.372                        | -     | 8.17                  | -     |
| THETA3    | 11325 | 1106  | 1255   | 0      | 10                | 9     | 15.7                         | 5.84  | 157                   | 52.6  |
| MCP124_4  | 9502  | 4016  | 7908   | 0      | 12                | 7     | 1.85                         | 2.11  | 22.2                  | 14.8  |
| MCP250_2  | 9764  | 5189  | 10128  | 0      | 11                | 8     | 0.785                        | 95.7  | 8.64                  | 766   |
| THETA4    | 20100 | 1949  | 2148   | 0      | 10                | 11    | 63.5                         | 26.2  | 635                   | 288   |
| SS30      | 17772 | 8655  | 23688  | 0      | 34                | -     | 2.22                         | -     | 75.4                  | -     |
| MCP250_3  | 21480 | 9713  | 19176  | 0      | 13                | 8     | 11.1                         | 95.4  | 145                   | 763   |
| THETA5    | 31375 | 3028  | 3277   | 0      | -                 | 10    | -                            | 94.1  | -                     | 941   |
| MCP250_4  | 34524 | 15442 | 30634  | 0      | 14                | 9     | 47.4                         | 94.4  | 664                   | 850   |