

| | | | | | | |
|-----|---|---|-----------|--------|-------------|----------|
| 80 | 0 | 0 | 720.69426 | 0 1164 | - 720.69426 | - - 33s |
| 81 | 0 | 0 | 720.75221 | 0 1160 | - 720.75221 | - - 34s |
| 82 | 0 | 0 | 720.80077 | 0 1211 | - 720.80077 | - - 34s |
| 83 | 0 | 0 | 720.88187 | 0 1167 | - 720.88187 | - - 34s |
| 84 | 0 | 0 | 720.93822 | 0 1215 | - 720.93822 | - - 34s |
| 85 | 0 | 0 | 720.98105 | 0 1213 | - 720.98105 | - - 34s |
| 86 | 0 | 0 | 721.02075 | 0 1193 | - 721.02075 | - - 35s |
| 87 | 0 | 0 | 721.05885 | 0 1163 | - 721.05885 | - - 35s |
| 88 | 0 | 0 | 721.11848 | 0 1131 | - 721.11848 | - - 35s |
| 89 | 0 | 0 | 721.17448 | 0 1107 | - 721.17448 | - - 35s |
| 90 | 0 | 0 | 721.23047 | 0 1085 | - 721.23047 | - - 35s |
| 91 | 0 | 0 | 721.28644 | 0 1059 | - 721.28644 | - - 35s |
| 92 | 0 | 0 | 721.35483 | 0 1116 | - 721.35483 | - - 36s |
| 93 | 0 | 0 | 721.43600 | 0 1085 | - 721.43600 | - - 36s |
| 94 | 0 | 0 | 721.51587 | 0 1063 | - 721.51587 | - - 36s |
| 95 | 0 | 0 | 721.55987 | 0 889 | - 721.55987 | - - 36s |
| 96 | 0 | 0 | 721.55987 | 0 882 | - 721.55987 | - - 36s |
| 97 | 0 | 0 | 723.33333 | 0 421 | - 723.33333 | - - 39s |
| 98 | 0 | 0 | 723.33333 | 0 406 | - 723.33333 | - - 39s |
| 99 | 0 | 0 | 723.33333 | 0 390 | - 723.33333 | - - 43s |
| 100 | 0 | 0 | 723.33333 | 0 569 | - 723.33333 | - - 47s |
| 101 | 0 | 0 | 723.33333 | 0 605 | - 723.33333 | - - 48s |
| 102 | 0 | 0 | 723.41126 | 0 955 | - 723.41126 | - - 51s |
| 103 | 0 | 0 | 723.41126 | 0 955 | - 723.41126 | - - 51s |
| 104 | 0 | 0 | 723.41126 | 0 855 | - 723.41126 | - - 52s |
| 105 | 0 | 0 | 723.41126 | 0 854 | - 723.41126 | - - 52s |
| 106 | 0 | 0 | 723.94801 | 0 525 | - 723.94801 | - - 59s |
| 107 | 0 | 0 | 723.94801 | 0 525 | - 723.94801 | - - 59s |
| 108 | 0 | 0 | 723.98340 | 0 698 | - 723.98340 | - - 61s |
| 109 | 0 | 0 | 723.98340 | 0 695 | - 723.98340 | - - 61s |
| 110 | 0 | 0 | 723.98621 | 0 663 | - 723.98621 | - - 61s |
| 111 | 0 | 0 | 724.11247 | 0 846 | - 724.11247 | - - 61s |
| 112 | 0 | 0 | 724.41224 | 0 970 | - 724.41224 | - - 62s |
| 113 | 0 | 0 | 724.41431 | 0 1149 | - 724.41431 | - - 63s |
| 114 | 0 | 0 | 724.41431 | 0 1145 | - 724.41431 | - - 63s |
| 115 | 0 | 0 | 724.55996 | 0 1503 | - 724.55996 | - - 66s |
| 116 | 0 | 0 | 724.55996 | 0 1473 | - 724.55996 | - - 66s |
| 117 | 0 | 0 | 724.80733 | 0 1380 | - 724.80733 | - - 67s |
| 118 | 0 | 0 | 724.80815 | 0 1229 | - 724.80815 | - - 68s |
| 119 | 0 | 0 | 724.95088 | 0 1397 | - 724.95088 | - - 69s |
| 120 | 0 | 0 | 724.95088 | 0 1382 | - 724.95088 | - - 70s |
| 121 | 0 | 0 | 724.96200 | 0 1334 | - 724.96200 | - - 70s |
| 122 | 0 | 0 | 724.96539 | 0 1398 | - 724.96539 | - - 71s |
| 123 | 0 | 0 | 724.96539 | 0 1355 | - 724.96539 | - - 71s |
| 124 | 0 | 0 | 725.07729 | 0 1397 | - 725.07729 | - - 73s |
| 125 | 0 | 0 | 725.07729 | 0 1366 | - 725.07729 | - - 73s |
| 126 | 0 | 0 | 725.10243 | 0 1422 | - 725.10243 | - - 74s |
| 127 | 0 | 0 | 725.10243 | 0 1422 | - 725.10243 | - - 74s |
| 128 | 0 | 0 | 725.10519 | 0 1419 | - 725.10519 | - - 74s |
| 129 | 0 | 0 | 725.23473 | 0 1382 | - 725.23473 | - - 76s |
| 130 | 0 | 0 | 725.27213 | 0 1462 | - 725.27213 | - - 77s |
| 131 | 0 | 0 | 725.27213 | 0 1471 | - 725.27213 | - - 77s |
| 132 | 0 | 0 | 725.27213 | 0 1421 | - 725.27213 | - - 78s |
| 133 | 0 | 0 | 725.97576 | 0 1347 | - 725.97576 | - - 80s |
| 134 | 0 | 0 | 726.13523 | 0 1396 | - 726.13523 | - - 81s |
| 135 | 0 | 0 | 726.13523 | 0 1390 | - 726.13523 | - - 81s |
| 136 | 0 | 0 | 726.17600 | 0 1369 | - 726.17600 | - - 82s |
| 137 | 0 | 0 | 726.17600 | 0 1340 | - 726.17600 | - - 82s |
| 138 | 0 | 0 | 726.32622 | 0 2003 | - 726.32622 | - - 85s |
| 139 | 0 | 0 | 726.32622 | 0 1978 | - 726.32622 | - - 85s |
| 140 | 0 | 0 | 726.38583 | 0 1845 | - 726.38583 | - - 86s |
| 141 | 0 | 0 | 726.38591 | 0 1877 | - 726.38591 | - - 86s |
| 142 | 0 | 0 | 726.52367 | 0 1556 | - 726.52367 | - - 88s |
| 143 | 0 | 0 | 726.52367 | 0 1448 | - 726.52367 | - - 88s |
| 144 | 0 | 0 | 726.52931 | 0 1383 | - 726.52931 | - - 89s |
| 145 | 0 | 0 | 726.55173 | 0 1288 | - 726.55173 | - - 89s |
| 146 | 0 | 0 | 726.55173 | 0 1348 | - 726.55173 | - - 90s |
| 147 | 0 | 0 | 726.55173 | 0 1309 | - 726.55173 | - - 90s |
| 148 | 0 | 0 | 726.77585 | 0 1707 | - 726.77585 | - - 92s |
| 149 | 0 | 0 | 726.77585 | 0 1686 | - 726.77585 | - - 92s |
| 150 | 0 | 0 | 726.78211 | 0 1723 | - 726.78211 | - - 93s |
| 151 | 0 | 0 | 726.79073 | 0 1765 | - 726.79073 | - - 93s |
| 152 | 0 | 0 | 726.79983 | 0 1897 | - 726.79983 | - - 94s |
| 153 | 0 | 0 | 726.79983 | 0 1862 | - 726.79983 | - - 94s |
| 154 | 0 | 0 | 726.80424 | 0 1794 | - 726.80424 | - - 94s |
| 155 | 0 | 0 | 726.80424 | 0 1819 | - 726.80424 | - - 95s |
| 156 | 0 | 0 | 726.80424 | 0 1818 | - 726.80424 | - - 95s |
| 157 | 0 | 0 | 726.92938 | 0 1775 | - 726.92938 | - - 97s |
| 158 | 0 | 0 | 726.92938 | 0 1724 | - 726.92938 | - - 97s |
| 159 | 0 | 0 | 726.97353 | 0 1830 | - 726.97353 | - - 98s |
| 160 | 0 | 0 | 726.97353 | 0 1813 | - 726.97353 | - - 98s |
| 161 | 0 | 0 | 726.98096 | 0 1821 | - 726.98096 | - - 99s |
| 162 | 0 | 0 | 726.98096 | 0 1791 | - 726.98096 | - - 99s |
| 163 | 0 | 0 | 727.07008 | 0 1639 | - 727.07008 | - - 102s |

| | | | | | | |
|-----|-----|-----|------------|-----------|--------------|------------------------------------|
| 164 | 0 | 0 | 727.07008 | 0 1646 | - 727.07008 | - - 102s |
| 165 | 0 | 0 | 727.11122 | 0 1771 | - 727.11122 | - - 103s |
| 166 | 0 | 0 | 727.11721 | 0 1657 | - 727.11721 | - - 103s |
| 167 | 0 | 0 | 727.11721 | 0 1645 | - 727.11721 | - - 104s |
| 168 | 0 | 0 | 727.20400 | 0 1677 | - 727.20400 | - - 106s |
| 169 | 0 | 0 | 727.22526 | 0 1710 | - 727.22526 | - - 107s |
| 170 | 0 | 0 | 727.22526 | 0 1616 | - 727.22526 | - - 107s |
| 171 | 0 | 0 | 727.22526 | 0 1599 | - 727.22526 | - - 108s |
| 172 | 0 | 0 | 727.26778 | 0 1359 | - 727.26778 | - - 110s |
| 173 | 0 | 0 | 727.26778 | 0 1328 | - 727.26778 | - - 110s |
| 174 | 0 | 0 | 727.31128 | 0 1535 | - 727.31128 | - - 111s |
| 175 | 0 | 0 | 727.31128 | 0 1579 | - 727.31128 | - - 112s |
| 176 | 0 | 0 | 727.31128 | 0 1563 | - 727.31128 | - - 112s |
| 177 | 0 | 0 | 727.39825 | 0 1584 | - 727.39825 | - - 114s |
| 178 | 0 | 0 | 727.39825 | 0 1546 | - 727.39825 | - - 114s |
| 179 | 0 | 0 | 727.39825 | 0 1509 | - 727.39825 | - - 114s |
| 180 | 0 | 0 | 727.49354 | 0 1113 | - 727.49354 | - - 116s |
| 181 | 0 | 0 | 727.49354 | 0 1057 | - 727.49354 | - - 116s |
| 182 | 0 | 0 | 727.49636 | 0 1086 | - 727.49636 | - - 117s |
| 183 | 0 | 0 | 727.55087 | 0 1307 | - 727.55087 | - - 119s |
| 184 | 0 | 0 | 727.55087 | 0 1290 | - 727.55087 | - - 119s |
| 185 | 0 | 0 | 727.55087 | 0 1330 | - 727.55087 | - - 120s |
| 186 | 0 | 0 | 727.62378 | 0 1515 | - 727.62378 | - - 122s |
| 187 | 0 | 0 | 727.62672 | 0 1524 | - 727.62672 | - - 122s |
| 188 | 0 | 0 | 727.67432 | 0 1458 | - 727.67432 | - - 124s |
| 189 | 0 | 0 | 727.67756 | 0 1578 | - 727.67756 | - - 125s |
| 190 | 0 | 0 | 727.67756 | 0 1575 | - 727.67756 | - - 125s |
| 191 | 0 | 0 | 727.79654 | 0 1308 | - 727.79654 | - - 127s |
| 192 | 0 | 0 | 727.79654 | 0 1282 | - 727.79654 | - - 127s |
| 193 | 0 | 0 | 727.79654 | 0 1290 | - 727.79654 | - - 128s |
| 194 | 0 | 0 | 727.79654 | 0 1281 | - 727.79654 | - - 128s |
| 195 | 0 | 0 | 727.89723 | 0 1251 | - 727.89723 | - - 130s |
| 196 | 0 | 0 | 727.89723 | 0 1271 | - 727.89723 | - - 130s |
| 197 | 0 | 0 | 727.90223 | 0 1118 | - 727.90223 | - - 131s |
| 198 | 0 | 0 | 727.90223 | 0 1312 | - 727.90223 | - - 131s |
| 199 | 0 | 0 | 728.01579 | 0 1049 | - 728.01579 | - - 133s |
| 200 | 0 | 0 | 728.01579 | 0 1144 | - 728.01579 | - - 134s |
| 201 | 0 | 0 | 728.01579 | 0 1109 | - 728.01579 | - - 134s |
| 202 | 0 | 0 | 728.06016 | 0 991 | - 728.06016 | - - 135s |
| 203 | 0 | 0 | 728.07039 | 0 1403 | - 728.07039 | - - 136s |
| 204 | 0 | 0 | 728.07039 | 0 1385 | - 728.07039 | - - 137s |
| 205 | 0 | 0 | 728.07039 | 0 1376 | - 728.07039 | - - 137s |
| 206 | 0 | 0 | 728.12250 | 0 1209 | - 728.12250 | - - 139s |
| 207 | 0 | 0 | 728.12250 | 0 1214 | - 728.12250 | - - 139s |
| 208 | 0 | 0 | 728.12250 | 0 1349 | - 728.12250 | - - 139s |
| 209 | 0 | 0 | 728.12250 | 0 1312 | - 728.12250 | - - 140s |
| 210 | 0 | 0 | 728.22837 | 0 1325 | - 728.22837 | - - 142s |
| 211 | 0 | 0 | 728.22837 | 0 1265 | - 728.22837 | - - 142s |
| 212 | 0 | 0 | 728.22839 | 0 1479 | - 728.22839 | - - 143s |
| 213 | 0 | 0 | 728.22839 | 0 1447 | - 728.22839 | - - 143s |
| 214 | 0 | 0 | 728.28269 | 0 1075 | - 728.28269 | - - 145s |
| 215 | 0 | 0 | 728.28269 | 0 1053 | - 728.28269 | - - 145s |
| 216 | 0 | 0 | 728.28269 | 0 1130 | - 728.28269 | - - 146s |
| 217 | 0 | 0 | 728.28269 | 0 1126 | - 728.28269 | - - 146s |
| 218 | 0 | 0 | 728.42308 | 0 1000 | - 728.42308 | - - 148s |
| 219 | 0 | 0 | 728.42308 | 0 1038 | - 728.42308 | - - 149s |
| 220 | 0 | 0 | 728.42308 | 0 1030 | - 728.42308 | - - 149s |
| 221 | 0 | 0 | 728.54631 | 0 507 | - 728.54631 | - - 151s |
| 222 | 0 | 0 | 728.54954 | 0 1271 | - 728.54954 | - - 153s |
| 223 | 0 | 0 | 728.54954 | 0 1217 | - 728.54954 | - - 154s |
| 224 | 0 | 0 | 728.57419 | 0 752 | - 728.57419 | - - 157s |
| 225 | 0 | 0 | 728.57419 | 0 737 | - 728.57419 | - - 157s |
| 226 | 0 | 0 | 728.57419 | 0 208 | - 728.57419 | - - 160s |
| 227 | 0 | 2 | 728.57419 | 0 208 | - 728.57419 | - - 168s |
| 228 | 1 | 4 | 728.75912 | 1 221 | - 728.75912 | - 1961 170s |
| 229 | 28 | 30 | 741.86051 | 6 541 | - 728.96541 | - 758 175s |
| 230 | 59 | 60 | 743.79473 | 11 589 | - 728.96541 | - 574 180s |
| 231 | 94 | 99 | 744.15705 | 20 518 | - 728.96541 | - 522 185s |
| 232 | 141 | 154 | 748.55146 | 30 580 | - 728.96541 | - 412 190s |
| 233 | 198 | 205 | 754.42233 | 38 489 | - 728.96541 | - 336 195s |
| 234 | 284 | 276 | infeasible | 57 | - 730.00000 | - 300 201s |
| 235 | 337 | 322 | 752.69823 | 12 285 | - 730.00000 | - 309 205s |
| 236 | 390 | 357 | 780.82719 | 20 675 | - 730.00000 | - 323 210s |
| 237 | 466 | 421 | 842.24253 | 29 388 | - 730.00000 | - 343 217s |
| 238 | * | 517 | 400 | 120 | 1042.0000000 | 730.00000 29.9% 319 217s |
| 239 | H | 522 | 392 | | 1010.0000000 | 730.00000 27.7% 318 219s |
| 240 | H | 529 | 285 | | 890.0000000 | 730.00000 18.0% 320 219s |
| 241 | | 541 | 294 | 845.93896 | 35 259 | 890.00000 730.00000 18.0% 325 220s |
| 242 | | 590 | 305 | 840.00000 | 9 373 | 890.00000 730.00000 18.0% 323 229s |
| 243 | | 598 | 316 | 840.00000 | 10 586 | 890.00000 730.00000 18.0% 341 231s |
| 244 | | 631 | 356 | 853.33333 | 12 435 | 890.00000 730.00000 18.0% 355 238s |
| 245 | | 672 | 363 | 859.39762 | 14 663 | 890.00000 730.00000 18.0% 346 240s |
| 246 | | 727 | 381 | 730.00000 | 6 575 | 890.00000 730.00000 18.0% 347 247s |
| 247 | | 738 | 393 | 733.33333 | 7 481 | 890.00000 730.00000 18.0% 353 250s |

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248 779 412 746.29681 11 691 890.00000 730.00000 18.0% 365 258s
249 802 418 740.25582 11 759 890.00000 730.00000 18.0% 366 262s
250 812 431 740.27458 13 922 890.00000 730.00000 18.0% 388 266s
251 830 452 740.80111 14 900 890.00000 730.00000 18.0% 400 270s
252 858 486 740.27458 14 1025 890.00000 730.00000 18.0% 406 276s
253 H 883 343 810.0000000 730.00000 9.88% 405 276s
254 896 314 742.04063 17 592 810.00000 730.00000 9.88% 404 282s
255 915 330 780.00000 19 350 810.00000 730.00000 9.88% 419 288s
256 937 342 750.00000 28 302 810.00000 730.00000 9.88% 431 293s
257 950 348 751.56863 30 392 810.00000 730.00000 9.88% 447 300s
258 980 379 760.00000 33 272 810.00000 730.00000 9.88% 457 305s
259 1019 413 763.33333 40 359 810.00000 730.00000 9.88% 470 310s
260 1070 414 797.00000 107 208 810.00000 730.00000 9.88% 478 355s
261 1072 415 797.00000 84 99 810.00000 730.00000 9.88% 477 362s
262 1073 416 744.24866 14 357 810.00000 734.82634 9.28% 477 370s
263 1075 417 795.00000 29 548 810.00000 736.66667 9.05% 476 375s
264 1076 418 752.97853 29 566 810.00000 736.99852 9.01% 476 382s
265 1077 419 768.63704 36 220 810.00000 739.84688 8.66% 475 394s
266 1078 419 790.00000 72 693 810.00000 739.84688 8.66% 475 396s
267 1080 421 741.86274 7 602 810.00000 740.00000 8.64% 474 400s
268 1081 421 790.00000 51 254 810.00000 743.30407 8.23% 473 411s
269 1083 423 773.33333 21 582 810.00000 744.10985 8.13% 473 415s
270 1085 424 752.92322 12 864 810.00000 744.75981 8.05% 472 420s
271 1086 425 799.73509 44 974 810.00000 744.76156 8.05% 471 425s
272 1087 425 794.53649 69 445 810.00000 744.83267 8.05% 471 432s
273 1090 427 758.00000 29 772 810.00000 745.03703 8.02% 469 436s
274 1093 429 756.66667 31 750 810.00000 745.13644 8.01% 468 440s
275 1094 430 758.40000 13 580 810.00000 745.17661 8.00% 468 448s
276 1096 431 790.00000 71 808 810.00000 745.20177 8.00% 467 453s
277 1097 432 752.38806 32 361 810.00000 745.22030 8.00% 466 459s
278 1098 433 745.22030 11 473 810.00000 745.22030 8.00% 466 463s
279 1099 433 770.00000 45 394 810.00000 745.22030 8.00% 466 468s
280 H 1099 410 770.0000000 745.22030 3.22% 466 469s
281 1101 412 770.00000 32 547 770.00000 745.24858 3.21% 465 471s
282 1102 412 759.17897 35 403 770.00000 745.51155 3.18% 464 477s
283 H 1102 391 750.0000000 745.51155 0.60% 464 478s
284
285 Cutting planes:
286 Learned: 6
287 Gomory: 14
288 Cover: 60
289 Implied bound: 19
290 Clique: 112
291 MIR: 27
292 StrongCG: 20
293 Flow cover: 100
294 GUB cover: 62
295 Zero half: 47
296 RLT: 88
297 Relax-and-lift: 32
298 BQP: 26
299
300 Explored 1102 nodes (744026 simplex iterations) in 480.06 seconds (951.31 work units)
301 Thread count was 8 (of 8 available processors)
302
303 Solution count 6: 750 770 810 ... 1042
304
305 Optimal solution found (tolerance 1.00e-04)
306 Best objective 7.500000000000e+02, best bound 7.500000000000e+02, gap 0.0000%
307 Optimal Obj: 750.0
308 Obj = 750.0
309 Solutions
310 Vessel i: 0: li: 7, pi: 7-14, ai-di: 3-34, taoi-deltai: 3-32, periodi: 29, taoPi_SP-deltaPi_SP: 3-11, periodPi: 8, betaNi: 17, bi: 29, Txijt:
203, o1i: 203, o2i: 160, o3i: -567, o4i: 340, Ti: 136
311 Vessel i: 1: li: 5, pi: 15-20, ai-di: 12-22, taoi-deltai: 12-20, periodi: 8, taoPi_SP-deltaPi_SP: 12-15, periodPi: 3, betaNi: 4, bi: 8, Txijt:
: 40, o1i: 40, o2i: 60, o3i: -125, o4i: 80, Ti: 55
312 Vessel i: 2: li: 5, pi: 20-25, ai-di: 27-35, taoi-deltai: 27-33, periodi: 6, taoPi_SP-deltaPi_SP: 27-29, periodPi: 2, betaNi: 4, bi: 6, Txijt:
: 30, o1i: 30, o2i: 40, o3i: -100, o4i: 80, Ti: 50
313 Vessel i: 3: li: 7, pi: 27-34, ai-di: 24-60, taoi-deltai: 24-58, periodi: 34, taoPi_SP-deltaPi_SP: 24-33, periodPi: 9, betaNi: 20, bi: 34,
Txijt: 238, o1i: 238, o2i: 180, o3i: -675, o4i: 400, Ti: 143
314 Vessel i: 4: li: 5, pi: 21-26, ai-di: 35-41, taoi-deltai: 35-39, periodi: 4, taoPi_SP-deltaPi_SP: 35-37, periodPi: 2, betaNi: 2, bi: 4, Txijt:
: 20, o1i: 20, o2i: 40, o3i: -50, o4i: 40, Ti: 50
315 Vessel i: 5: li: 6, pi: 14-20, ai-di: 31-60, taoi-deltai: 31-46, periodi: 15, taoPi_SP-deltaPi_SP: 31-36, periodPi: 5, betaNi: 9, bi: 15,
Txijt: 90, o1i: 90, o2i: 100, o3i: -260, o4i: 180, Ti: 110
316 Vessel i: 6: li: 6, pi: 8-14, ai-di: 40-80, taoi-deltai: 40-64, periodi: 24, taoPi_SP-deltaPi_SP: 40-46, periodPi: 6, betaNi: 15, bi: 24,
Txijt: 144, o1i: 144, o2i: 120, o3i: -468, o4i: 300, Ti: 96
317 Vessel i: 7: li: 6, pi: 20-26, ai-di: 43-72, taoi-deltai: 43-56, periodi: 13, taoPi_SP-deltaPi_SP: 43-48, periodPi: 5, betaNi: 7, bi: 13,
Txijt: 78, o1i: 78, o2i: 100, o3i: -208, o4i: 140, Ti: 110
318 TimeSolveModel: 500.000000
319
320
321
322 TimeAll: 504.000000
323
```

unknown

324
325
326