Notes: 'n' represents the dimension of the corresponding problem. 'NI' represents the total number of iterations. 'NF' represents the number of the function evaluation. 'T' represents the running time of the algorithm. '$\|g^\star\|$' represents the gradient value for the solution. The values of 'NI', 'NF', 'T' and '$\|g^\star\|$' are set as 'NaN' if and only if the number of iterations is greater than 3000.

Table 1: Numerical results for Test 1

Problem/n	SHCGMcc-MAX NI/NF/T/$\|g^\star\|$	SHCGMcc-MIN NI/NF/T/$\|g^\star\|$	SHCGMcc-AVG NI/NF/T/$\|g^\star\|$	SHCGMcc-GEO NI/NF/T/$\|g^\star\|$
cosine/600	16/66/0.021/4.75e-06	43/100/0.010/7.63e-06	24/75/0.014/9.69e-06	32/92/0.008/2.79e-06
cosine/3000	17/68/0.012/9.73e-06	67/134/0.021/9.90e-06	19/73/0.012/6.24e-06	25/78/0.013/9.73e-06
cosine/10000	23/81/0.033/3.89e-06	40/101/0.045/8.81e-06	29/87/0.034/6.26e-06	28/84/0.035/9.48e-06
dixmaana/6000	16/74/0.113/4.53e-06	14/74/0.093/2.17e-06	17/76/0.093/6.08e-06	15/73/0.091/6.24e-06
dixmaana/9000	16/76/0.147/4.59e-06	21/81/0.155/4.14e-06	16/68/0.131/8.38e-06	13/70/0.131/4.92e-06
dixmaanb/4800	11/66/0.090/7.09e-06	19/76/0.076/4.46e-06	16/78/0.077/4.77e-06	19/79/0.076/4.19e-06
dixmaanb/24000	16/83/0.366/5.38e-06	18/77/0.356/9.35e-06	17/79/0.464/8.12e-07	21/84/0.443/2.49e-06
dixmaanc/270	13/62/0.039/4.91e-06	14/66/0.010/6.45e-06	16/68/0.009/1.77e-06	10/62/0.007/9.19e-06
dixmaanc/2700	22/81/0.057/3.17e-06	25/88/0.058/3.85e-06	22/78/0.045/6.95e-06	29/101/0.061/6.10e-06
dixmaand/1200	20/72/0.043/3.12e-06	22/76/0.029/9.51e-06	17/71/0.026/3.54e-06	17/74/0.027/2.01e-06
dixmaand/9000	14/74/0.182/9.38e-06	17/78/0.231/7.23e-06	15/77/0.216/2.24e-06	14/71/0.225/8.56e-06
dixmaane/2400	439/809/0.666/8.92e-06	440/498/0.384/8.20e-06	311/483/0.367/7.73e-06	345/536/0.412/9.22e-06
dixmaane/4800	566/1040/1.484/7.12e-06	500/567/0.812/9.08e-06	390/621/0.936/9.98e-06	428/650/0.987/7.93e-06
dixmaanf/6000	554/1004/2.669/9.75e-06	510/571/1.331/8.95e-06	527/837/1.815/9.55e-06	438/676/2.155/9.12e-06
dixmaanf/15000	1589/2872/26.730/6.76e-07	1690/1953/18.584/9.98e-06	1316/2058/19.830/9.03e-06	1383/2112/20.093/9.66e-06
dixmaang/6000	462/845/3.366/9.79e-06	728/812/2.775/8.11e-06	390/622/2.474/8.05e-06	438/674/2.865/9.02e-06
dixmaang/12000	1721/3062/23.231/7.71e-06	1457/1745/13.547/9.83e-06	1193/1858/13.808/6.65e-06	1234/1875/12.880/2.80e-06
dixmaanh/6000	1176/2113/4.482/8.36e-06	1167/1476/2.894/8.23e-06	969/1494/2.876/5.58e-06	979/1484/2.772/5.50e-06
dixmaanh/15000	1028/1907/14.690/9.86e-06	858/943/7.734/9.88e-06	802/1282/10.784/6.08e-06	846/1348/11.224/8.52e-06
dixmaani/360	2195/4079/0.785/9.92e-06	1299/1355/0.289/9.48e-06	2373/3793/0.631/8.28e-06	2378/3733/0.768/9.74e-06
dixmaanj/3000	300/538/0.563/7.69e-06	929/1051/0.996/8.78e-06	273/426/0.412/8.84e-06	258/405/0.382/5.77e-06
dixmaanj/15000	435/788/7.409/8.72e-06	848/921/8.938/9.64e-06	709/1080/9.530/6.96e-06	725/1105/10.858/9.56e-06
dixmaank/6000	337/609/1.724/5.95e-06	669/825/1.812/8.17e-06	330/526/1.272/7.79e-06	346/538/1.207/9.55e-06
dixmaank/12000	153/295/2.205/5.08e-06	1003/1278/10.172/9.94e-06	427/686/3.007/6.25e-06	660/1023/4.247/7.43e-06
dixmaanl/1200	286/535/0.165/8.20e-06	2010/2114/0.600/8.11e-06	399/648/0.177/9.82e-06	449/703/0.182/9.96e-06
dixmaanl/2400	79/147/0.073/9.73e-06	NaN/NaN/NaN/NaN	135/228/0.114/9.88e-06	162/271/0.136/9.16e-06
dixon3dq/50	515/935/0.013/9.18e-06	479/528/0.005/9.83e-06	603/946/0.009/9.46e-06	580/891/0.008/8.43e-06
dixon3dq/150	2931/5435/0.049/7.20e-06	1404/1452/0.014/7.95e-06	2929/4694/0.043/8.71e-06	1068/1650/0.015/9.73e-06
dqdrtic/300	121/263/0.008/9.99e-06	72/225/0.003/7.22e-06	59/159/0.002/6.85e-06	59/148/0.002/8.52e-06
dqrtic/5000	41/147/0.150/6.31e-06	53/160/0.157/8.64e-06	52/159/0.157/2.19e-06	47/155/0.200/9.56e-07
dqdrtic/9000	120/285/0.053/1.39e-06	107/336/0.044/5.40e-06	84/217/0.026/8.28e-06	89/207/0.028/4.58e-06
edensch/500	28/85/0.023/8.86e-06	43/101/0.015/6.31e-06	27/83/0.017/5.63e-06	32/87/0.026/8.25e-06
edensch/1000	33/97/0.049/2.95e-06	46/113/0.050/9.91e-06	35/94/0.028/9.63e-06	31/92/0.031/6.08e-06
edensch/4000	35/105/0.123/8.38e-06	72/161/0.191/9.83e-06	36/112/0.176/9.36e-06	39/111/0.160/7.11e-06
eg2/100	2620/5449/0.230/9.91e-06	177/617/0.033/7.12e-06	1919/4082/0.218/7.29e-06	1921/4050/0.192/9.44e-06
fletchcr/100	37/89/0.015/4.57e-06	47/117/0.005/9.77e-06	36/91/0.004/2.47e-06	38/93/0.003/6.63e-06
fletchcr/500	39/105/0.004/7.13e-06	81/217/0.009/6.07e-06	30/90/0.003/2.88e-06	34/94/0.004/9.85e-06
fletchcr/2000	45/139/0.009/3.99e-06	65/228/0.013/9.67e-06	68/424/0.027/9.59e-06	98/655/0.053/8.23e-06
freuroth/40	295/676/0.035/6.86e-06	263/865/0.029/8.10e-06	208/477/0.016/9.94e-06	291/730/0.023/8.13e-06
genrose/100	1432/2371/0.086/5.79e-06	740/845/0.030/8.03e-06	945/1369/0.050/9.56e-06	885/1257/0.053/5.59e-06
himmelbg/700	2/15/0.009/1.35e-29	2/15/0.001/1.35e-29	2/15/0.001/1.35e-29	2/15/0.001/1.35e-29
himmelbg/2400	2/10/0.002/5.14e-20	2/10/0.002/5.12e-20	2/10/0.002/5.13e-20	2/10/0.002/5.13e-20
liarwhd/6000	1375/2954/0.373/5.37e-06	169/513/0.044/2.20e-06	631/1385/0.134/9.83e-06	515/1131/0.114/7.42e-06
liarwhd/3000	679/1424/0.111/9.19e-06	146/418/0.026/3.41e-06	406/901/0.075/8.82e-06	265/687/0.061/1.78e-06
penalty1/100	17/101/0.017/1.61e-06	17/101/0.005/1.51e-06	17/101/0.005/2.02e-06	17/101/0.006/3.08e-06
penalty1/1000	27/196/0.143/3.24e-06	31/199/0.162/7.81e-06	28/193/0.164/4.58e-07	29/199/0.144/3.28e-06
quartc/4000	56/157/0.201/2.25e-06	56/163/0.243/5.25e-06	53/161/0.247/2.06e-06	66/177/0.236/8.54e-06
quartc/8000	57/166/0.371/4.31e-06	62/174/0.395/7.43e-06	51/165/0.366/5.23e-06	49/159/0.344/6.92e-06
quartc/50000	93/259/5.912/2.71e-06	89/223/5.181/8.28e-06	107/262/5.868/8.18e-06	89/266/5.976/3.57e-06
tridia/300	783/1429/0.102/9.72e-06	626/693/0.024/9.68e-06	792/1245/0.045/9.87e-06	817/1250/0.078/8.84e-06
tridia/2000	NaN/NaN/NaN/NaN	2014/2090/0.175/9.36e-06	NaN/NaN/NaN/NaN	NaN/NaN/NaN/NaN
woods/1500	352/733/0.080/6.17e-06	150/398/0.019/9.17e-06	178/375/0.032/6.81e-06	249/546/0.029/9.84e-06
woods/2000	305/637/0.030/6.51e-06	177/322/0.016/6.08e-06	342/689/0.033/8.20e-06	192/449/0.022/7.66e-06
bdexp/5000	2/11/0.024/4.40e-111	2/11/0.009/4.39e-111	2/11/0.009/4.39e-111	2/11/0.007/4.39e-111
bdexp/50000	2/16/0.106/3.49e-89	2/16/0.144/3.49e-89	2/16/0.146/3.49e-89	2/16/0.144/3.49e-89
bdexp/5000	2/11/0.013/4.40e-111	2/11/0.010/4.39e-111	2/11/0.008/4.39e-111	2/11/0.006/4.39e-111
exdenschnf/9000	31/99/0.041/7.10e-06	46/117/0.019/5.81e-06	29/99/0.014/2.66e-06	27/92/0.013/5.29e-06
exdenschnf/2800	23/86/0.006/8.75e-06	54/123/0.008/8.46e-06	22/88/0.006/3.99e-06	31/98/0.007/9.79e-06
exdenschnf/6000	23/79/0.010/6.91e-06	36/104/0.012/3.09e-06	37/107/0.013/2.31e-07	29/94/0.010/4.86e-06
exdenschnb/3000	18/74/0.012/9.81e-06	39/97/0.009/5.06e-06	17/70/0.005/9.14e-06	18/74/0.005/6.61e-06
exdenschnb/6000	17/74/0.007/3.04e-06	17/75/0.006/5.65e-06	18/75/0.006/7.79e-07	21/79/0.007/1.17e-06
exdenschnb/24000	17/75/0.015/6.09e-06	18/79/0.017/9.65e-06	18/76/0.016/1.56e-06	21/80/0.017/2.35e-06
genquartic/9000	15/74/0.028/9.51e-06	28/88/0.014/4.99e-06	20/80/0.013/6.98e-06	18/76/0.011/2.78e-06
genquartic/9000	15/74/0.010/9.51e-06	28/88/0.013/4.99e-06	20/80/0.012/6.98e-06	18/76/0.011/2.78e-06
genquartic/50000	22/85/0.053/5.72e-07	17/79/0.048/9.15e-06	22/87/0.047/7.23e-06	16/77/0.040/6.63e-06
biggsb1/300	2049/3755/0.157/8.86e-06	1149/1210/0.043/8.38e-06	2424/3883/0.188/6.71e-06	2906/4539/0.253/9.61e-06
sine/500	338/750/0.099/9.67e-06	228/371/0.030/9.88e-06	142/308/0.023/6.95e-06	73/159/0.021/6.84e-06
sine/1000	28/82/0.018/9.28e-06	58/144/0.034/9.85e-06	38/93/0.022/5.03e-06	34/87/0.021/8.73e-06
sine/2000	101/211/0.058/9.54e-07	1742/2524/0.491/6.95e-06	81/175/0.040/8.65e-06	67/175/0.055/7.00e-06
fletcbv3/50	584/1111/0.064/9.78e-06	NaN/NaN/NaN/NaN	596/1265/0.070/9.36e-06	NaN/NaN/NaN/NaN
nonscomp/5000	46/114/0.036/5.75e-06	220/310/0.040/9.80e-06	47/117/0.012/6.91e-06	48/117/0.012/6.57e-06
nonscomp/8000	NaN/NaN/NaN/NaN	1966/2599/0.373/7.91e-06	NaN/NaN/NaN/NaN	NaN/NaN/NaN/NaN
power1/150	NaN/NaN/NaN/NaN	2477/2593/0.113/8.29e-06	NaN/NaN/NaN/NaN	NaN/NaN/NaN/NaN
raydan1/500	218/380/0.031/7.25e-06	279/346/0.045/9.00e-06	170/277/0.041/8.77e-06	182/284/0.035/9.50e-06
raydan1/1000	319/587/0.056/8.18e-06	379/450/0.077/8.26e-06	268/427/0.044/5.11e-06	296/450/0.040/6.09e-06
raydan2/1000	15/70/0.014/6.53e-06	15/70/0.006/6.53e-06	15/70/0.006/6.53e-06	15/70/0.008/6.53e-06
raydan2/2000	12/63/0.010/5.09e-06	12/63/0.012/5.09e-06	12/63/0.015/5.09e-06	12/63/0.015/5.09e-06
raydan2/5000	10/71/0.028/1.06e-06	10/71/0.020/1.06e-06	10/71/0.019/1.06e-06	10/71/0.020/1.06e-06
diagonal1/800	469/2813/0.304/7.48e-06	644/4086/0.434/9.64e-06	1380/13252/1.508/8.79e-06	1410/12268/1.469/9.23e-06
diagonal1/1500	731/5398/1.040/9.71e-06	2701/25074/4.647/6.87e-06	2305/22703/4.308/9.25e-06	1213/10506/2.082/9.76e-06
diagonal2/5000	758/1437/0.642/8.50e-06	420/622/0.276/9.95e-06	535/880/0.370/9.16e-06	538/858/0.384/9.78e-06
diagonal2/10000	1330/2448/1.935/5.69e-06	584/875/0.804/9.25e-06	917/1475/1.198/9.66e-06	910/1441/1.164/8.35e-06
diagonal3/200	129/252/0.022/8.12e-06	193/436/0.018/9.48e-06	160/599/0.025/6.27e-06	209/1177/0.048/9.00e-06
diagonal3/500	208/395/0.023/9.33e-06	1143/9001/0.759/8.19e-06	501/3649/0.294/9.42e-06	904/7537/0.536/9.73e-06
diagonal3/2000	1377/10869/2.023/7.99e-06	NaN/NaN/NaN/NaN	NaN/NaN/NaN/NaN	NaN/NaN/NaN/NaN
osb2/11	1180/2192/0.208/9.56e-06	423/752/0.049/8.11e-06	918/1536/0.110/9.63e-06	736/1251/0.101/9.85e-06
ie/150	12/46/0.362/9.08e-06	16/52/0.669/8.93e-06	17/53/0.551/3.30e-06	18/55/0.476/3.19e-06
ie/500	13/52/4.626/8.30e-06	12/45/3.958/7.38e-06	9/41/3.202/4.75e-06	12/50/4.992/7.03e-06
singx/500	1627/3212/1.557/9.01e-06	224/571/0.217/7.76e-06	1829/3670/1.756/9.52e-06	1126/2298/1.100/7.01e-06
singx/1000	1619/3259/8.995/9.42e-06	247/611/1.497/8.39e-06	495/1037/3.409/9.04e-06	1228/2414/7.244/9.14e-06
singx/2000	2567/5127/61.154/9.99e-06	424/1063/13.889/6.78e-06	1446/2934/35.144/3.13e-06	819/1685/22.578/4.74e-06
lin/50	10/57/0.067/2.08e-06	10/57/0.013/2.08e-06	10/57/0.010/2.08e-06	10/57/0.011/2.08e-06
lin/100	13/63/0.021/8.86e-07	13/63/0.020/8.86e-07	13/63/0.021/8.86e-07	13/63/0.021/8.86e-07
pen1/200	199/928/0.093/9.07e-06	106/532/0.041/4.20e-06	99/402/0.032/8.72e-06	127/634/0.049/8.20e-06
pen1/1000	144/795/8.027/7.95e-06	97/483/4.853/6.41e-06	165/585/6.476/8.74e-06	77/565/6.419/9.04e-06
pen2/160	NaN/NaN/NaN/NaN	268/635/0.082/9.99e-06	191/795/0.098/5.57e-06	NaN/NaN/NaN/NaN
rosex/500	445/930/1.221/8.52e-06	69/300/0.310/9.54e-06	228/495/0.445/3.10e-06	179/406/0.364/8.23e-06
rosex/1000	427/891/6.950/8.97e-06	95/327/2.795/8.26e-06	100/273/2.457/8.29e-06	204/494/3.933/8.58e-06
trid/400	87/165/0.178/1.19e-06	154/209/0.126/7.96e-06	85/148/0.093/4.95e-06	79/141/0.091/8.08e-06
trid/800	38/92/0.210/5.75e-06	127/182/0.411/8.68e-06	39/93/0.192/6.82e-06	40/93/0.152/4.13e-06