Heuristic Algorithms

Achieved Results for Particle Swarm Optimization

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FES	5×10^3	5×10^4	5×10^5
Best	7.6140	5.6929	5.6929
Median	42.2543	43.0818	39.1301
Worst	22.3860	22.3860	22.3860
v	5180.9502	10789.3696	15294.0576
Mean	41.7595	43.8086	40.6689
std	25.4131	22.9083	22.4267

Table 1: Error Values Problem pg01 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	0.4212	0.4171	0.4171
Median	0.6192	0.6212	0.6241
Worst	0.9422	0.9422	0.9422
v	0.0000	0.0000	0.0000
Mean	0.6132	0.6150	0.6172
std	0.0454	0.0444	0.0422

Table 2: Error Values Problem pg02 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	1.0005	1.0005	1.0005
Median	0.9788	0.9871	0.9823
Worst	1.0005	1.0005	1.0005
v	17.9586	37.0069	55.1672
Mean	0.9158	0.9229	0.9187
std	0.5271	0.4301	0.3620

Table 3: Error Values Problem pg03 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	928.8337	719.5242	544.7489
Median	2150.3431	2005.8107	1924.2220
Worst	56764.7864	56764.7864	56764.7864
v	1.1020	1.8749	2.2073
Mean	2122.8859	2054.9241	1967.8722
std	869.3176	822.3478	807.2398

Table 4: Error Values Problem pg04 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	993.7631	1098.1349	770.0169
Median	978.5830	1107.9368	1052.7634
Worst	13623.2964	13623.2964	13623.2964
v	13927.2920	27889.0378	41587.7671
Mean	1479.3920	1635.5734	1561.7096
std	1212.4399	1202.5135	1159.5919

Table 5: Error Values Problem pg05 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	1255.8408	1255.8408	2694.9523
Median	11277.2161	11594.4716	13337.0112
Worst	140200.2738	154385.3996	168005.8147
v	23954.6020	54652.4515	87120.3825
Mean	23886.3318	26892.3376	27943.4912
std	35652.8441	37113.8315	38943.2701

Table 6: Error Values Problem pg06 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	38.7104	24.5473	24.5473
Median	1169.1195	1080.8463	1080.8463
Worst	3532.1988	3532.1988	3532.1988
v	9847.5612	18269.1892	27247.0715
Mean	1394.7292	1362.9485	1336.2142
std	904.3026	948.3616	906.7735

Table 7: Error Values Problem pg07 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	0.0000	0.0000	0.0000
Median	0.1049	0.0973	0.0969
Worst	4.3791	4.3791	77.9019
v	144.4738	251.1272	328.0660
Mean	2.9181	3.1684	3.1253
std	9.4701	8.8225	10.8346

Table 8: Error Values Problem pg08 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	27.1545	27.1545	27.1545
Median	20271.5694	11426.9215	14545.0797
Worst	5150047.1837	7397894.6180	8224401.9154
v	5908.7617	9948.3947	12722.6825
Mean	887441.3932	901541.5496	973874.1024
std	1491430.8317	1714400.4258	1925800.2048

Table 9: Error Values Problem pg09 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	9755.4671	9755.4671	9755.4671
Median	9634.4239	9464.2908	8531.5856
Worst	31996.6906	31996.6906	31996.6906
v	966538.4879	4284304.2973	4605327.8169
Mean	9678.5374	8929.4214	8675.5335
std	4488.7077	4311.2027	4209.5014

Table 10: Error Values Problem pg10 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	0.2306	0.1682	0.1682
Median	0.1608	0.1576	0.1632
Worst	2.0232	2.7611	2.7611
v	2.5555	5.6396	8.3876
Mean	0.2002	0.1987	0.2022
std	0.1308	0.1972	0.1935

Table 11: Error Values Problem pg11 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	0.0103	0.0103	0.0103
Median	0.1040	0.1138	0.1132
Worst	1.6375	1.4853	1.4853
v	2.2078	3.6834	5.7025
Mean	0.1120	0.1284	0.1256
std	0.0742	0.0885	0.0815

Table 12: Error Values Problem pg12 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	0.1278	0.9607	0.9607
Median	0.8964	0.9448	0.9381
Worst	8.8829	61.3585	61.3585
v	67.7728	143.7868	202.4412
Mean	1.1922	2.5095	2.3460
std	1.6643	8.0380	7.5067

Table 13: Error Values Problem pg13 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	254.0630	86.2103	86.2103
Median	451.9396	412.6012	427.7433
Worst	349.5928	181.7401	181.7401
v	412.8732	769.8297	1140.8928
Mean	462.2929	433.5211	430.4273
std	111.2958	112.0658	116.7946

Table 14: Error Values Problem pg14 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	4.9332	4.9332	1.2399
Median	12.6185	11.6057	11.6894
Worst	1944.1081	1945.4405	1945.4405
v	606.7443	1048.6562	1481.1633
Mean	27.2189	23.1397	21.5759
std	31.0600	31.7195	28.4343

Table 15: Error Values Problem pg15 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	1.1207	1.0894	1.0894
Median	1.1642	0.9275	0.8845
Worst	1.1481	0.3519	4.1005
v	186436.1901	357959.4419	562425.3671
Mean	1.1679	1.0736	1.1261
std	0.7697	0.7758	1.1812

Table 16: Error Values Problem pg16 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	1541.6560	64.6810	64.6810
Median	4128.5755	4600.0137	3258.6449
Worst	39056.5259	39056.5259	39056.5259
v	4781.2423	8820.7739	13082.3136
Mean	5124.7291	4877.2949	4669.4038
std	4781.3447	4197.1711	4453.0172

Table 17: Error Values Problem pg17 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	6.0020	1.8324	1.8324
Median	7.1473	5.3003	5.3860
Worst	21.0858	23.8463	23.8463
v	8219.6765	13243.2268	19752.3021
Mean	9.0455	7.4508	7.4062
std	6.2793	6.2710	5.8372

Table 18: Error Values Problem pg18 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	658.9501	658.9501	591.4117
Median	4067.5893	3457.3843	4331.6991
Worst	30305.1418	30305.1418	30809.6439
v	52.0700	145.4908	179.6638
Mean	6934.1730	5814.7969	6726.4370
std	8109.2095	6488.3904	6858.4830

Table 19: Error Values Problem pg19 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	8.9842	5.9644	8.9343
Median	11.7755	11.2749	11.9015
Worst	17.5564	17.5564	19.3347
v	288.8572	551.2114	843.4432
Mean	11.7924	11.3494	11.7578
std	2.4706	2.3633	2.3284

Table 20: Error Values Problem pg20 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	7.3176	168.5733	168.5733
Median	256.8352	259.1640	253.3140
Worst	1166.3008	1166.3008	1182.1208
v	8057.9668	13224.9309	20177.1392
Mean	317.6272	326.4074	330.4044
std	248.0696	240.0910	239.0083

Table 21: Error Values Problem pg21 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	13496.4942	13496.4942	13496.4942
Median	8819.2180	9450.1821	9263.9856
Worst	18546.9606	19375.0807	19375.0807
v	7025373532.7309	13411078494.4787	20478446636.8978
Mean	9041.4897	9623.3882	9729.1182
std	4461.4076	4930.9365	4976.5549

Table 22: Error Values Problem pg22 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	207.9905	102.4499	102.4499
Median	680.1569	641.7037	624.9752
Worst	1008.0044	1495.3553	1495.3553
v	764.4635	1640.3265	2325.0269
Mean	729.5688	809.6397	760.2714
std	494.7305	609.3779	574.3612

Table 23: Error Values Problem pg23 using Particle Swarm Optimization

FES	5×10^3	5×10^4	5×10^5
Best	0.0046	0.0000	0.0000
Median	1.7058	1.7183	1.6851
Worst	8.0788	6.1208	6.1208
v	1.2729	4.6569	6.0281
Mean	1.7863	1.8562	1.8516
std	0.7726	0.8702	0.9736

Table 24: Error Values Problem pg24 using Particle Swarm Optimization

Max FES	**Prob.**	**Best**	**Median**	**Worst**	**Mean**	**Std**	**FR**	**SR**	**SP**
5000	pg01	6.9690	42.2543	22.3860	41.7595	25.4131	0.0000	0.0000	-1.0000
50000	pg01	5.6929	43.0818	22.3860	43.8086	22.9083	0.0333	0.0000	-1.0000
500000	pg01	1.5531	39.1301	22.3860	40.6689	22.4267	0.0333	0.0000	-1.0000

Table 25: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	**Prob.**	**Best**	**Median**	**Worst**	**Mean**	**Std**	**FR**	**SR**	**SP**
5000	pg02	0.4212	0.6192	0.9422	0.6132	0.0454	1.0000	0.0000	-1.0000
50000	pg02	0.4171	0.6212	0.9422	0.6150	0.0444	1.0000	0.0000	-1.0000
500000	pg02	0.4171	0.6241	0.9422	0.6172	0.0422	1.0000	0.0000	-1.0000

Table 26: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	**Prob.**	**Best**	**Median**	**Worst**	**Mean**	**Std**	**FR**	**SR**	**SP**
5000	pg03	0.1454	0.9788	1.0005	0.9158	0.5271	0.0000	0.0000	-1.0000
50000	pg03	0.0213	0.9871	1.0005	0.9229	0.4301	0.0000	0.0000	-1.0000
500000	pg03	0.0213	0.9823	1.0005	0.9187	0.3620	0.0333	0.0000	-1.0000

Table 27: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	**Prob.**	**Best**	**Median**	**Worst**	**Mean**	**Std**	**FR**	**SR**	**SP**
5000	pg04	673.7217	2150.3431	56764.7864	2122.8859	869.3176	0.9000	0.0000	-1.0000
50000	pg04	673.7217	2005.8107	56764.7864	2054.9241	822.3478	0.9333	0.0000	-1.0000
500000	pg04	544.7489	1924.2220	56764.7864	1967.8722	807.2398	0.9667	0.0000	-1.0000

Table 28: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg05	81.8250	978.5830	13623.2964	1479.3920	1212.4399	0.0000	0.0000	-1.0000
50000	pg05	2.1653	1107.9368	13623.2964	1635.5734	1202.5135	0.0000	0.0000	-1.0000
500000	pg05	2.1653	1052.7634	13623.2964	1561.7096	1159.5919	0.0000	0.0000	-1.0000

Table 29: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg06	1206.6228	11277.2161	140200.2738	23886.3318	35652.8441	0.0000	0.0000	-1.0000
50000	pg06	108.8391	11594.4716	154385.3996	26892.3376	37113.8315	0.0000	0.0000	-1.0000
500000	pg06	108.8391	13337.0112	168005.8147	27943.4912	38943.2701	0.0667	0.0000	-1.0000

Table 30: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg07	38.7104	1169.1195	3532.1988	1394.7292	904.3026	0.0333	0.0000	-1.0000
50000	pg07	24.5473	1080.8463	3532.1988	1362.9485	948.3616	0.0333	0.0000	-1.0000
500000	pg07	24.5473	1080.8463	3532.1988	1336.2142	906.7735	0.0333	0.0000	-1.0000

Table 31: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg08	0.0000	0.1049	4.3791	2.9181	9.4701	0.1667	0.0333	148684.0000
50000	pg08	0.0000	0.0973	4.3791	3.1684	8.8225	0.1000	0.0000	-1.0000
500000	pg08	0.0000	0.0969	77.9019	3.1253	10.8346	0.1000	0.0333	14803488.0000

Table 32: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg09	27.1545	20271.5694	5150047.1837	887441.3932	1491430.8317	0.1667	0.0000	-1.0000
50000	pg09	27.1545	11426.9215	7397894.6180	901541.5496	1714400.4258	0.1333	0.0000	-1.0000
500000	pg09	27.1545	14545.0797	8224401.9154	973874.1024	1925800.2048	0.3333	0.0000	-1.0000

Table 33: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg10	11.2105	9634.4239	31996.6906	9678.5374	4488.7077	0.0000	0.0000	-1.0000
50000	pg10	11.2105	9464.2908	31996.6906	8929.4214	4311.2027	0.0333	0.0000	-1.0000
500000	pg10	11.2105	8531.5856	31996.6906	8675.5335	4209.5014	0.0333	0.0000	-1.0000

Table 34: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg11	0.0138	0.1608	2.0232	0.2002	0.1308	0.0333	0.0000	-1.0000
50000	pg11	0.0049	0.1576	2.7611	0.1987	0.1972	0.0333	0.0000	-1.0000
500000	pg11	0.0049	0.1632	2.7611	0.2022	0.1935	0.0667	0.0000	-1.0000

Table 35: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg12	0.0103	0.1040	1.6375	0.1120	0.0742	0.2333	0.0000	-1.0000
50000	pg12	0.0103	0.1138	1.4853	0.1284	0.0885	0.2333	0.0000	-1.0000
500000	pg12	0.0103	0.1132	1.4853	0.1256	0.0815	0.2667	0.0000	-1.0000

Table 36: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg13	0.0194	0.8964	8.8829	1.1922	1.6643	0.0000	0.0000	-1.0000
50000	pg13	0.0055	0.9448	61.3585	2.5095	8.0380	0.0333	0.0000	-1.0000
500000	pg13	0.0055	0.9381	61.3585	2.3460	7.5067	0.0000	0.0000	-1.0000

Table 37: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg14	254.0630	451.9396	349.5928	462.2929	111.2958	0.0000	0.0000	-1.0000
50000	pg14	86.2103	412.6012	181.7401	433.5211	112.0658	0.0000	0.0000	-1.0000
500000	pg14	86.2103	427.7433	181.7401	430.4273	116.7946	0.0000	0.0000	-1.0000

Table 38: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg15	1.3572	12.6185	1944.1081	27.2189	31.0600	0.0333	0.0000	-1.0000
50000	pg15	0.0778	11.6057	1945.4405	23.1397	31.7195	0.0000	0.0000	-1.0000
500000	pg15	0.0494	11.6894	1945.4405	21.5759	28.4343	0.0667	0.0000	-1.0000

Table 39: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg16	0.0397	1.1642	1.1481	1.1679	0.7697	0.0333	0.0000	-1.0000
50000	pg16	0.0397	0.9275	0.3519	1.0736	0.7758	0.0333	0.0000	-1.0000
500000	pg16	0.0397	0.8845	4.1005	1.1261	1.1812	0.0333	0.0000	-1.0000

Table 40: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg17	132.8436	4128.5755	39056.5259	5124.7291	4781.3447	0.0000	0.0000	-1.0000
50000	pg17	64.6810	4600.0137	39056.5259	4877.2949	4197.1711	0.0000	0.0000	-1.0000
500000	pg17	37.4151	3258.6449	39056.5259	4669.4038	4453.0172	0.0000	0.0000	-1.0000

Table 41: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg18	0.1991	7.1473	21.0858	9.0455	6.2793	0.0000	0.0000	-1.0000
50000	pg18	0.1991	5.3003	23.8463	7.4508	6.2710	0.0000	0.0000	-1.0000
500000	pg18	0.1894	5.3860	23.8463	7.4062	5.8372	0.0000	0.0000	-1.0000

Table 42: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg19	658.9501	4067.5893	30305.1418	6934.1730	8109.2095	0.9333	0.0000	-1.0000
50000	pg19	658.9501	3457.3843	30305.1418	5814.7969	6488.3904	0.8667	0.0000	-1.0000
500000	pg19	591.4117	4331.6991	30809.6439	6726.4370	6858.4830	0.9333	0.0000	-1.0000

Table 43: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg20	6.4581	11.7755	17.5564	11.7924	2.4706	0.0000	0.0000	-1.0000
50000	pg20	5.9644	11.2749	17.5564	11.3494	2.3633	0.0000	0.0000	-1.0000
500000	pg20	5.9644	11.9015	19.3347	11.7578	2.3284	0.0000	0.0000	-1.0000

Table 44: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg21	7.3176	256.8352	1166.3008	317.6272	248.0696	0.0000	0.0000	-1.0000
50000	pg21	7.3176	259.1640	1166.3008	326.4074	240.0910	0.0000	0.0000	-1.0000
500000	pg21	7.3176	253.3140	1182.1208	330.4044	239.0083	0.0000	0.0000	-1.0000

Table 45: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg22	1594.3905	8819.2180	18546.9606	9041.4897	4461.4076	0.0000	0.0000	-1.0000
50000	pg22	808.5705	9450.1821	19375.0807	9623.3882	4930.9365	0.0000	0.0000	-1.0000
500000	pg22	808.5705	9263.9856	19375.0807	9729.1182	4976.5549	0.0000	0.0000	-1.0000

Table 46: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg23	36.1702	680.1569	1008.0044	729.5688	494.7305	0.0000	0.0000	-1.0000
50000	pg23	36.1702	641.7037	1495.3553	809.6397	609.3779	0.0000	0.0000	-1.0000
500000	pg23	6.5284	624.9752	1495.3553	760.2714	574.3612	0.0000	0.0000	-1.0000

Table 47: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance

Max FES	Prob.	Best	Median	Worst	Mean	Std	FR	SR	SP
5000	pg24	0.0046	1.7058	8.0788	1.7863	0.7726	0.9000	0.0000	-1.0000
50000	pg24	0.0000	1.7183	6.1208	1.8562	0.8702	0.8000	0.0333	1453932.0000
500000	pg24	0.0000	1.6851	6.1208	1.8516	0.9736	0.8667	0.0333	14803680.0000

Table 48: Particle Swarm Optimization. Number of FES to achieve the fixed accuracy level ($f(\mathbf{x}) - f(\mathbf{x}^*) \leq 0.0001$), Success Rate, Feasible Rate and Success Performance