Supplementary File of "Multiobjective Multitasking Optimization with Decomposition-based Adaptive Knowledge Transfer"

Anonymous Authors

A. Comparison Results on CEC2019.

Table II lists the statistics of mean IGD values and derivations obtained by all MMTEAs after 50 independent runs for handling the CPLX problems in CEC2019. Due to page limitation, the corresponding average HV results of all methods on CEC2019 problems are also shown in Table S. II of the supplementary file. The CPLX problem is composed of MOPs with complex PS shapes, and there is no intersection of PSs between different tasks within the same group except for CPLX2, CPLX4, and CPLX10. As observed in Table S. II, when compared with four algorithms based on Pareto dominance relations, i.e., MO-MFEA-II, MO-MFEA-SADE, EMTET, and MTDE-MKTA, the decomposition-based MMTEA-DAKT shows a significant advantage as it performs better on 20, 19, 20 and 20 cases out of 20 cases, while it performs worse only on 0, 1, 0 and 0 cases. Besides, MMTEA-DAKT exhibits excellent superiority over decomposition-based MTEA/D-DN, as it performs better in all cases. The reason behind the poor performance of the four algorithms based on Pareto dominance relations is that the fine-grained subproblem division and the utilization of neighborhood relations in the decomposition-based framework can improve the efficiency of knowledge transfer. Moreover, MMTEA-DAKT gathers the advantages of different transfer crossover operators and dynamically adjusts the resource allocation ratio according to the feedback results of task transfer and subproblem optimization, which can avoid the waste of computational resources and alleviate the impact of negative transfer. Therefore, our proposed MMTEA-DAKT performs significantly better than the decomposition-based MTEA/D-DN.

B. Convergence Profiles

To observe the convergence speed of our proposed algorithm and other compared algorithms, the convergence profiles of all algorithms on solving PILS2, NIMS2, CPLX1_2, CPLX8_2, ETMOF2_1, and ETMOF8_2 are plotted in Fig. S. 1 of the supplementary file. As seen in Fig. S. 1, the convergence speed of MMTEA-DAKT is the fastest in solving CPLX1_2 and ETMOF8_2. In the meanwhile, other algorithms converge more slowly, therefore, it is difficult for them to obtain a satisfactory IGD level finally. When solving PILS2, NIMS2, CPLX8_2, and ETMOF2_1, although our proposed MMTEA-DAKT doesn't show the fastest convergence speed, it has the best IGD level at last, which also shows the excellent search search ability of our proposed MMTEA-DAKT. Summarily, our proposed MMTEA-DAKT has the superior performance in solving various tasks, which can be attributed to our proposed adaptive subproblems selection method and adaptive knowledge transfer strategy.

C. Comparison Results on Many-task Optimization Problems

To verify the performance of our proposed MMTEA-DAKT in solving multiobjective manytasking optimization problems, MATP1-MATP5 test problems in WCCI2020 [44] are used for experimental comparisons, where each test problem has fifty tasks. Due to page limitations, Table S. III in the supplementary file presents the average results and derivations of IGD values obtained by all algorithms in 50 dependent runs for tackling MATP1-MATP5. As seen in Table S. III, MMTEA-DAKT performs better than MOMFEA-II, MTEA/D-DN, MO-MFEA-SADE. EMTET, and MTDE-MKTA on 141, 247, 193 and 137 problems, respectively, while performs worse only on 55, 3, 53, and 4 cases, respectively. Therefore, our proposed MMTEA-DAKT also has the superior performance in solving manytasking optimization problems, which can further verify the effectiveness of the proposed adaptive subproblems selection and knowledge transfer strategy.

D. Parameter Analysis

In this article, the sensitivity of the parameter T_p is investigated, which controls the transfer ratio in MMTEA-DAKT. In this section, the values of T_p are set as T_p = 0.1, 0.3, 0.7, and 0.9. CEC2017, CEC2019, and CEC2021 are adopted to analyze the impact of T_p in MMTEA-DAKT. Due to page limitations, Table S. IV in the supplementary file provides the mean IGD results obtained by MMTEA-DAKT with four different T_p values in 30 runs for solving all problems in CEC2017, CEC2019, and CEC2021. As observed in the last row of Table S. IV, the Friedman ranks of MMTEA-DAKT with T_p = 0.1, 0.3, 0.7 and 0.9 are 1.5, 2.1, 2.7 and 3.7, respectively. Accordingly, the performance rank of MMTEA-DAKT deteriorates from T_p = 0.1 to T_p = 0.9. The reason behind this might be that the great difference among all tasks makes the transfer knowledge gained from other source tasks lead to the negative transfer. Therefore, T_p is suggested to be set as 0.1 in this paper.

TABLE S. I: The Mean Values and Standard Deviations of HV Statistical Results Obtained by MMTEA-DAKT with its Compared MMTEAs in CEC2017

	MOMFEAII	MTEA-D-DN	MO-MFEA-SADE	EMTET	MTDE-MKTA	MMTEADAKT
CIHS1	2.8170e-01(1.66e-02)+	1.5786e-01(1.08e-02)+	7.1900e-02(5.58e-02)+	5.9212e-04(1.87e-03)+	5.2781e-03(1.14e-02)+	**3.4605e-01(5.62e-04)**
CIHS2	2.2326e-01(2.12e-02)+	1.0929e-01(1.69e-02)+	6.3550e-02(4.39e-02)+	1.6101e-04(4.76e-04)+	7.4185e-03(2.10e-02)+	**4.2359e-01(4.77e-03)**
CIMS1	1.5085e-01(1.96e-01)+	7.1798e-02(8.25e-02)+	4.4387e-01(2.35e-04)+	1.8483e-01(1.69e-01)+	4.3789e-01(2.82e-03)+	**4.4490e-01(7.49e-05)**
CIMS2	6.4106e-02(9.43e-02)+	3.9177e-02(6.60e-02)+	3.4501e-01(4.05e-04)+	1.2376e-01(1.04e-01)+	3.3010e-01(3.15e-03)+	**3.4668e-01(1.78e-04)**
CILS1	3.2235e-01(5.98e-03)+	1.3592e-01(7.16e-02)+	1.8525e-01(2.99e-02)+	7.8568e-03(1.06e-02)+	0.0000e+00(0.00e+00)+	**3.4252e-01(1.41e-03)**
CILS2	7.1188e-01(6.37e-04)+	7.0780e-01(9.09e-03)+	7.1054e-01(4.56e-04)+	7.0558e-01(2.45e-03)+	6.7439e-01(1.08e-02)+	**7.1938e-01(1.07e-04)**
PIHS1	6.3935e-01(4.66e-02)+	6.8709e-01(7.79e-03)=	1.7724e-02(3.74e-02)+	0.0000e+00(0.00e+00)+	0.0000e+00(0.00e+00)+	**6.9204e-01(1.43e-02)**
PIHS2	0.0000e+00(0.00e+00)+	0.0000e+00(0.00e+00)+	1.5228e-02(3.30e-02)+	0.0000e+00(0.00e+00)+	0.0000e+00(0.00e+00)+	**5.7215e-01(1.95e-01)**
PIMS1	1.6230e-01(8.50e-02)+	8.9181e-03(1.66e-02)+	5.7469e-02(1.33e-01)+	7.4378e-02(4.62e-02)+	2.3800e-01(2.90e-02)=	**2.3159e-01(3.78e-02)**
PIMS2	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)=	**7.1102e-02(3.75e-02)-**	0.0000e+00(0.00e+00)=	1.3302e-01(2.14e-01)=	0.0000e+00(0.00e+00)
PILS1	3.2424e-01(7.90e-03)+	1.3251e-01(4.29e-02)+	**4.8962e-01(4.01e-02)-**	5.1563e-02(3.80e-02)+	2.9326e-02(3.13e-02)+	3.3501e-01(6.13e-03)
PILS2	8.7771e-04(2.48e-03)+	0.0000e+00(0.00e+00)+	**3.4081e-01(2.25e-03)-**	0.0000e+00(0.00e+00)+	0.0000e+00(0.00e+00)+	3.0080e-01(2.22e-02)
NIHS1	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)=	**8.3860e-02(9.83e-02)-**	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)
NIHS2	6.6495e-01(1.40e-02)+	7.0396e-01(3.75e-03)+	1.3096e-01(2.08e-01)+	6.5959e-03(1.45e-02)+	8.2968e-02(1.14e-01)+	**7.1307e-01(2.72e-03)**
NIMS1	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)=	**2.0488e-01(3.86e-01)-**	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)
NIMS2	7.5985e-02(1.16e-01)+	6.9855e-02(6.60e-02)+	1.4155e-01(1.17e-01)+	9.0611e-02(1.45e-01)+	2.6061e-01(1.18e-01)+	**4.4026e-01(3.25e-03)**
NILS1	4.4907e-01(1.82e-02)+	1.4319e-01(5.03e-02)+	**7.6627e-01(3.28e-02)-**	0.0000e+00(0.00e+00)+	0.0000e+00(0.00e+00)+	5.0737e-01(2.01e-02)
NILS2	0.0000e+00(0.00e+00)=	5.0433e-03(1.59e-02)=	**9.1464e-02(2.52e-04)-**	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)=	0.0000e+00(0.00e+00)
+ / - / =	14/0/4	13/0/5	11/7/0	14/0/4	13/0/5	

TABLE S. II: The Mean Values and Standard Deviations of HV Statistical Results Obtained by MMTEA-DAKT with its Compared MMTEAs in CEC2019

	MOMFEAII	MTEA-D-DN	MO-MFEA-SADE	EMTET	MTDE-MKTA	MMTEADAKT
CPLX1_1	7.0055e-01(1.39e-03)+	7.1094e-01(7.42e-04)+	6.3953e-01(3.61e-02)+	7.0079e-01(1.27e-03)+	7.1316e-01(6.09e-04)+	**7.1929e-01(2.60e-04)**
CPLX1_2	6.8298e-01(1.24e-02)+	6.4628e-01(5.46e-02)+	6.4224e-01(8.95e-03)+	6.6471e-01(1.70e-02)+	6.8752e-01(4.79e-03)+	**7.1416e-01(5.26e-04)**
CPLX2_1	7.0159e-01(1.10e-03)+	7.1042e-01(1.11e-03)+	**7.7138e-01(1.94e-02)-**	7.0324e-01(2.15e-03)+	7.1465e-01(7.62e-04)+	7.1934e-01(2.42e-04)
CPLX2_2	5.8771e-01(2.38e-02)+	5.3772e-01(5.53e-02)+	**8.8975e-01(1.37e-02)-**	5.4771e-01(3.09e-02)+	4.4219e-01(5.40e-02)+	6.9802e-01(3.65e-03)
CPLX3_1	6.0960e-01(1.83e-02)+	6.3065e-01(3.12e-02)+	6.6934e-01(7.10e-02)=	5.9762e-01(1.07e-02)+	6.2491e-01(1.44e-02)+	**6.6433e-01(2.19e-02)**
CPLX3_2	6.6518e-01(5.23e-03)+	6.2254e-01(3.04e-02)+	**7.6558e-01(1.36e-02)-**	6.5091e-01(7.18e-03)+	6.5951e-01(4.22e-03)+	6.9233e-01(2.20e-03)
CPLX4_1	5.8291e-01(3.91e-02)+	6.1626e-01(9.10e-02)+	4.1921e-01(8.86e-02)+	6.0448e-01(2.22e-02)+	6.2616e-01(4.02e-03)+	**6.8395e-01(7.15e-03)**
CPLX4_2	3.2423e-01(3.07e-02)+	1.7332e-01(7.32e-04)+	2.2140e-01(6.58e-02)+	3.3648e-01(1.65e-02)+	3.5368e-01(2.12e-03)+	**4.0576e-01(8.83e-03)**
CPLX5_1	6.6484e-01(3.64e-03)+	6.4813e-01(4.79e-03)+	**7.0998e-01(8.93e-03)-**	6.4754e-01(4.30e-03)+	6.5491e-01(4.01e-03)+	6.9187e-01(1.99e-03)
CPLX5_2	2.3165e-01(7.83e-02)+	2.1963e-01(3.94e-02)+	**9.9300e-01(2.80e-04)-**	1.7784e-01(5.13e-02)+	4.0278e-01(1.06e-02)+	4.5946e-01(2.43e-03)
CPLX6_1	6.6338e-01(8.52e-03)+	6.4665e-01(6.44e-03)+	3.7762e-01(1.78e-01)+	6.5104e-01(3.82e-03)+	6.5362e-01(4.33e-03)+	**6.8133e-01(3.87e-03)**
CPLX6_2	3.2019e-01(4.29e-02)+	1.8456e-01(2.36e-02)+	2.2555e-01(6.61e-02)+	3.2591e-01(1.48e-02)+	3.4454e-01(2.82e-03)+	**3.7469e-01(6.96e-03)**
CPLX7_1	6.6318e-01(3.72e-03)+	6.3483e-01(1.41e-02)+	6.3108e-01(8.11e-02)+	6.5881e-01(3.15e-03)+	6.6313e-01(2.35e-03)+	**6.9578e-01(2.43e-03)**
CPLX7_2	6.7267e-01(6.93e-03)+	6.4907e-01(2.54e-03)+	6.7243e-01(8.30e-02)+	6.6957e-01(5.61e-03)+	6.7504e-01(3.80e-03)+	**6.9435e-01(5.79e-03)**
CPLX8_1	6.6755e-01(4.60e-03)+	6.4703e-01(2.76e-03)+	**8.3605e-01(2.68e-02)-**	6.5583e-01(6.46e-03)+	6.6873e-01(5.14e-03)+	6.9060e-01(5.24e-03)
CPLX8_2	5.0763e-01(7.01e-02)+	6.2811e-01(3.67e-02)+	**9.1724e-01(2.38e-02)-**	4.6491e-01(5.48e-02)+	3.8461e-01(9.74e-02)+	6.9534e-01(1.46e-02)
CPLX9_1	1.7083e-01(9.20e-02)+	2.3205e-01(5.93e-02)+	**9.1507e-01(5.49e-02)-**	6.9139e-02(5.38e-02)+	3.8278e-01(1.41e-02)+	4.5897e-01(3.42e-03)
CPLX9_2	3.0508e-01(5.08e-02)+	1.8065e-01(7.31e-03)+	2.3757e-01(8.71e-02)+	2.8579e-01(3.78e-02)+	3.3807e-01(2.65e-03)+	**3.7260e-01(2.27e-02)**
CPLX10_1	4.4473e-01(1.65e-01)+	5.9839e-01(2.12e-01)+	6.0257e-01(2.50e-02)+	4.7141e-01(1.74e-01)+	2.5334e-01(1.22e-01)+	**6.7495e-01(2.61e-02)**
CPLX10_2	4.8638e-01(1.74e-01)+	5.8262e-01(2.06e-01)+	4.1903e-01(2.25e-04)+	4.7892e-01(1.73e-01)+	2.2869e-01(1.05e-01)+	**6.2337e-01(3.87e-02)**
+ / - / =	20/0/0	20/0/0	11/8/1	20/0/0	20/0/0	

TABLE S. III: The Mean Values and Standard Deviations of IGD Statistical Results Obtained by MMTEA-DAKT with its Compared MMTEAs on Solving Task1–Task50 of MATP1–MATP5 Problems of WCCI2020

	MOMFEA-II	MTEA-D-DN	MOMFEA-SADE	EMT-ET	MTDE-MKTA	MMTEA-DAKT
WCCI20-MATP1-T1	6.0847e-01(1.14e-01)-	3.2653e-02(8.97e-03)-	2.2330e+03(1.22e+02)+	1.4562e+00(4.16e-01)=	**4.4782e-03(1.48e-04)-**	4.7214e+00(1.04e+01)
WCCI20-MATP1-T2	4.7182e-01(1.49e-01)-	3.1395e-02(7.41e-03)-	2.4417e+03(7.97e+01)+	1.4979e+00(4.66e-01)=	**4.4462e-03(1.35e-04)-**	1.0693e+01(1.34e+01)
WCCI20-MATP1-T3	5.8157e-01(1.47e-01)+	3.2367e-02(1.02e-02)+	2.7865e+03(1.48e+02)+	1.5495e+00(5.08e-01)+	**4.4572e-03(8.54e-05)-**	6.7128e-03(1.66e-02)
WCCI20-MATP1-T4	5.6890e-01(7.85e-02)-	3.0939e-02(9.06e-03)-	2.1656e+03(1.02e+02)+	1.4116e+00(1.22e-01)=	**4.4259e-03(1.90e-04)-**	9.7104e+00(1.13e+01)
WCCI20-MATP1-T5	5.3350e-01(1.05e-01)-	3.0208e-02(8.93e-03)-	2.7841e+03(1.94e+02)+	1.2890e+00(2.37e-01)=	**4.3724e-03(5.30e-05)-**	4.3524e+00(6.69e+00)
WCCI20-MATP1-T6	4.5486e-01(7.11e-02)-	3.6595e-02(1.28e-02)-	2.2668e+03(1.82e+02)+	1.3297e+00(4.80e-01)=	**4.4660e-03(9.39e-05)-**	5.8250e+00(1.28e+01)
WCCI20-MATP1-T7	4.8667e-01(1.02e-01)-	4.1138e-02(2.27e-02)-	2.3070e+03(1.01e+02)+	1.2374e+00(2.61e-01)=	**4.3983e-03(6.27e-05)-**	6.9426e+00(1.31e+01)
WCCI20-MATP1-T8	5.1578e-01(8.81e-02)=	2.9536e-02(5.82e-03)-	2.8426e+03(1.58e+02)+	1.4099e+00(1.51e-01)-	**4.4647e-03(5.53e-05)-**	3.7211e+00(9.56e+00)
WCCI20-MATP1-T9	4.9182e-01(1.67e-01)=	3.7430e-02(1.07e-02)-	2.2567e+03(1.31e+02)+	1.5140e+00(1.98e-01)=	**4.7409e-03(9.38e-04)-**	4.1315e+00(6.06e+00)
WCCI20-MATP1-T10	5.6028e-01(6.77e-02)-	3.1105e-02(8.48e-03)-	1.7493e+03(8.13e+01)+	1.3900e+00(4.27e-01)=	**4.6259e-03(1.93e-04)-**	1.0757e+01(9.20e+00)
WCCI20-MATP1-T11	4.9358e-01(8.44e-02)=	2.6281e-02(3.52e-03)-	2.5338e+03(1.83e+02)+	1.5631e+00(2.45e-01)=	**4.4609e-03(1.92e-04)-**	3.5458e+00(6.50e+00)
WCCI20-MATP1-T12	6.1121e-01(2.03e-01)-	2.8600e-02(4.23e-03)-	2.0840e+03(2.15e+02)+	1.3746e+00(1.87e-01)=	**4.4173e-03(7.98e-05)-**	1.0943e+01(1.13e+01)
WCCI20-MATP1-T13	5.1028e-01(1.26e-01)=	3.1489e-02(1.11e-02)-	2.4623e+03(1.16e+02)+	1.2808e+00(2.57e-01)=	**1.0263e-02(1.54e-02)-**	1.1544e+00(1.98e+00)
WCCI20-MATP1-T14	5.0764e-01(6.62e-02)-	3.9870e-02(1.39e-02)-	2.4548e+03(1.48e+02)+	1.3392e+00(2.99e-01)-	**7.6753e-03(8.77e-03)-**	1.3393e+01(1.04e+01)
WCCI20-MATP1-T15	5.6184e-01(1.04e-01)=	2.9907e-02(1.98e-03)-	2.4736e+03(1.69e+02)+	1.3272e+00(3.38e-01)=	**8.5298e-03(1.08e-02)-**	7.1698e+00(1.13e+01)
WCCI20-MATP1-T16	4.7409e-01(1.43e-01)-	3.2712e-02(1.02e-02)-	2.5787e+03(2.52e+02)+	1.2967e+00(1.89e-01)=	**4.4788e-03(1.64e-04)-**	1.2387e+01(1.34e+01)
WCCI20-MATP1-T17	6.0474e-01(9.34e-02)=	3.5443e-02(7.31e-03)-	2.4361e+03(1.77e+02)+	1.5934e+00(3.26e-01)=	**4.4010e-03(6.96e-05)-**	6.5310e+00(1.15e+01)
WCCI20-MATP1-T18	5.8410e-01(1.50e-01)=	2.9673e-02(1.02e-02)-	2.8145e+03(2.09e+02)+	1.4924e+00(6.56e-01)=	**4.4003e-03(5.07e-05)-**	4.0821e+00(5.52e+00)
WCCI20-MATP1-T19	5.6651e-01(1.12e-01)-	2.7459e-02(6.57e-03)-	2.4608e+03(2.02e+02)+	1.5694e+00(3.31e-01)-	**5.5913e-03(2.92e-03)-**	1.1956e+01(1.01e+01)
WCCI20-MATP1-T20	5.7846e-01(1.70e-01)-	3.2084e-02(1.07e-02)-	1.9919e+03(1.18e+02)+	1.1213e+00(2.27e-01)=	**4.4283e-03(1.10e-04)-**	8.6290e+00(7.72e+00)
WCCI20-MATP1-T21	6.1387e-01(9.07e-02)+	3.3428e-02(6.35e-03)+	2.1875e+03(9.68e+01)+	1.3216e+00(2.88e-01)+	4.4389e-03(6.49e-05)+	**7.6482e-04(1.56e-03)**
WCCI20-MATP1-T22	6.0830e-01(5.85e-02)-	3.0026e-02(5.56e-03)-	2.4463e+03(9.90e+01)+	1.2595e+00(2.42e-01)=	**4.4042e-03(9.23e-05)-**	1.3506e+01(1.41e+01)
WCCI20-MATP1-T23	5.9600e-01(1.02e-01)-	2.9994e-02(7.60e-03)-	1.9271e+03(1.70e+02)+	1.2849e+00(3.52e-01)=	**4.5165e-03(1.74e-04)-**	8.0252e+00(1.02e+01)
WCCI20-MATP1-T24	4.8998e-01(1.03e-01)-	3.7401e-02(1.20e-02)-	2.3657e+03(2.91e+02)+	1.2488e+00(1.85e-01)=	**5.2114e-03(2.00e-03)-**	6.7853e+00(1.16e+01)
WCCI20-MATP1-T25	5.3825e-01(7.13e-02)-	3.6188e-02(1.69e-02)-	3.3981e+03(2.18e+02)+	1.3619e+00(3.39e-01)=	**4.4504e-03(1.26e-04)-**	1.2971e+01(1.58e+01)
WCCI20-MATP1-T26	5.6315e-01(1.68e-01)-	3.3168e-02(7.49e-03)-	1.7757e+03(8.28e+01)+	1.4392e+00(2.30e-01)=	**4.4642e-03(1.17e-04)-**	1.0648e+01(1.25e+01)
WCCI20-MATP1-T27	5.8960e-01(1.20e-01)+	3.3761e-02(9.49e-03)-	1.7944e+03(1.20e+02)+	1.3426e+00(3.11e-01)+	**4.4440e-03(9.94e-05)-**	3.1265e-01(8.27e-01)
WCCI20-MATP1-T28	5.8724e-01(1.07e-01)-	3.3898e-02(1.43e-02)-	2.0527e+03(8.26e+01)+	1.3906e+00(3.07e-01)=	**4.4676e-03(1.86e-04)-**	1.1913e+01(1.57e+01)
WCCI20-MATP1-T29	4.7838e-01(1.30e-01)-	3.6902e-02(1.32e-02)-	2.7882e+03(2.01e+02)+	1.5693e+00(5.14e-01)=	**4.5280e-03(2.47e-04)-**	1.0954e+01(1.39e+01)
WCCI20-MATP1-T30	5.5183e-01(1.49e-01)-	3.0403e-02(6.79e-03)-	2.5346e+03(2.01e+02)+	1.1479e+00(3.63e-01)=	**4.4184e-03(8.63e-05)-**	1.2212e+01(1.56e+01)
WCCI20-MATP1-T31	6.3573e-01(1.61e-01)=	3.6108e-02(9.41e-03)-	2.2860e+03(1.25e+02)+	1.4392e+00(2.66e-01)=	**4.4244e-03(1.42e-04)-**	3.7618e+00(6.89e+00)
WCCI20-MATP1-T32	5.1735e-01(1.25e-01)-	3.8990e-02(9.59e-03)-	3.0780e+03(1.15e+02)+	1.3488e+00(3.73e-01)=	**4.4888e-03(2.16e-04)-**	1.5244e+01(1.58e+01)
WCCI20-MATP1-T33	5.5980e-01(6.63e-02)-	3.1523e-02(1.41e-02)-	2.8533e+03(9.30e+01)+	1.3510e+00(3.30e-01)=	**4.4120e-03(1.09e-04)-**	6.2270e+00(7.71e+00)
WCCI20-MATP1-T34	6.4326e-01(1.52e-01)=	3.2208e-02(1.39e-02)-	2.9223e+03(2.07e+02)+	1.6486e+00(4.02e-01)=	**4.4342e-03(1.45e-04)-**	6.4789e+00(7.63e+00)
WCCI20-MATP1-T35	5.4782e-01(1.69e-01)-	2.9473e-02(7.33e-03)-	2.3019e+03(7.66e+01)+	1.5025e+00(2.04e-01)=	**4.4099e-03(1.52e-04)-**	1.0823e+01(1.15e+01)
WCCI20-MATP1-T36	5.7162e-01(1.60e-01)=	2.7753e-02(6.00e-03)-	2.3039e+03(1.13e+02)+	1.3620e+00(1.61e-01)=	**4.4598e-03(9.01e-05)-**	6.4785e+00(8.03e+00)
WCCI20-MATP1-T37	5.4395e-01(1.13e-01)-	3.0677e-02(6.01e-03)-	2.0946e+03(1.15e+02)+	1.3411e+00(3.44e-01)=	**4.4932e-03(1.32e-04)-**	9.3513e+00(9.75e+00)
WCCI20-MATP1-T38	5.3631e-01(1.12e-01)-	3.2268e-02(1.13e-02)-	3.0843e+03(2.21e+02)+	1.3955e+00(3.64e-01)=	**4.4456e-03(2.04e-04)-**	9.4051e+00(1.15e+01)
WCCI20-MATP1-T39	4.4777e-01(7.59e-02)-	3.1876e-02(6.74e-03)-	2.3291e+03(4.98e+01)+	1.2511e+00(3.94e-01)=	**4.4043e-03(9.04e-05)-**	8.1250e+00(8.48e+00)
WCCI20-MATP1-T40	5.3972e-01(1.21e-01)-	2.9423e-02(3.92e-03)-	2.4814e+03(1.14e+02)+	1.5649e+00(3.52e-01)=	**4.5110e-03(1.41e-04)-**	5.1891e+00(4.53e+00)
WCCI20-MATP1-T41	5.5240e-01(7.94e-02)-	3.4045e-02(1.19e-02)-	2.7018e+03(1.17e+02)+	1.2874e+00(4.03e-01)=	**4.4363e-03(7.40e-05)-**	1.2461e+01(1.21e+01)
WCCI20-MATP1-T42	5.3175e-01(7.64e-02)-	3.4113e-02(8.56e-03)-	2.3183e+03(1.16e+02)+	1.2548e+00(2.48e-01)=	**4.4193e-03(9.53e-05)-**	1.4159e+01(1.54e+01)
WCCI20-MATP1-T43	5.5734e-01(1.29e-01)-	3.0233e-02(9.28e-03)-	2.3001e+03(1.78e+02)+	1.1773e+00(1.91e-01)=	**4.4586e-03(1.28e-04)-**	7.3727e+00(1.22e+01)
WCCI20-MATP1-T44	5.1427e-01(1.77e-01)-	3.1610e-02(9.02e-03)-	2.5812e+03(1.88e+02)+	1.3537e+00(3.51e-01)=	**4.4494e-03(1.59e-04)-**	1.0999e+01(1.64e+01)
WCCI20-MATP1-T45	5.4135e-01(1.38e-01)-	2.9089e-02(4.59e-03)-	2.5769e+03(9.29e+01)+	1.3657e+00(2.68e-01)=	**4.3778e-03(6.24e-05)-**	9.4418e+00(1.13e+01)
WCCI20-MATP1-T46	5.2052e-01(1.16e-01)-	3.3981e-02(6.80e-03)-	1.8804e+03(9.06e+01)+	1.1748e+00(2.37e-01)=	**4.3955e-03(6.77e-05)-**	7.4076e+00(1.07e+01)
WCCI20-MATP1-T47	4.5356e-01(7.38e-02)+	2.9530e-02(7.94e-03)-	2.5371e+03(9.82e+01)+	1.2580e+00(1.88e-01)+	**4.3585e-03(7.93e-05)-**	2.1352e-01(5.31e-01)
WCCI20-MATP1-T48	5.0370e-01(9.37e-02)-	2.9860e-02(7.39e-03)-	1.9225e+03(1.07e+02)+	1.4039e+00(5.29e-01)=	**4.3856e-03(8.73e-05)-**	7.7803e+00(1.12e+01)
WCCI20-MATP1-T49	5.7205e-01(1.19e-01)-	2.9740e-02(7.59e-03)-	2.3882e+03(2.94e+02)+	1.2797e+00(1.99e-01)=	**4.5038e-03(1.31e-04)-**	1.0702e+01(1.41e+01)
WCCI20-MATP1-T50	5.6294e-01(8.84e-02)-	3.5559e-02(8.07e-03)-	9.8770e-03(3.82e-04)=	1.4094e+00(4.11e-01)=	**5.7829e-03(3.63e-03)-**	6.5962e+00(1.53e+01)
WCCI20-MATP2-T1	1.2462e+01(1.03e+00)+	2.9838e+02(5.42e+01)+	1.1064e+03(2.06e+01)+	2.0301e+02(4.35e+01)+	1.3081e+02(2.59e+01)+	**1.0312e+01(5.12e+00)**
WCCI20-MATP2-T2	1.2950e+01(5.13e-01)+	2.6757e+02(2.75e+01)+	9.0697e+02(4.08e+01)+	1.8890e+02(2.06e+01)+	1.1605e+02(1.08e+01)+	**9.5351e+00(6.23e+00)**
WCCI20-MATP2-T3	1.2674e+01(1.97e+00)+	2.7004e+02(3.99e+01)+	1.0459e+03(3.16e+01)+	1.8917e+02(3.84e+01)+	1.4279e+02(4.26e+01)+	**9.8871e+00(6.07e+00)**
WCCI20-MATP2-T4	1.2780e+01(1.11e+00)+	2.4974e+02(4.66e+01)+	1.1739e+03(3.15e+01)+	2.2795e+02(4.00e+01)+	1.1705e+02(1.99e+01)+	**8.7507e+00(6.42e+00)**
WCCI20-MATP2-T5	1.2197e+01(9.70e-01)+	2.4688e+02(3.82e+01)+	1.0384e+03(5.01e+01)+	2.0113e+02(4.40e+01)+	1.2073e+02(2.50e+01)+	**9.3701e+00(6.26e+00)**
WCCI20-MATP2-T6	1.5119e+01(1.80e+00)=	2.6897e+02(8.06e+01)+	1.1342e+03(4.50e+01)+	1.8979e+02(2.69e+01)+	1.1528e+02(2.46e+01)+	**1.4335e+01(5.79e+00)**
WCCI20-MATP2-T7	**1.2242e+01(2.05e+00)=**	2.7798e+02(4.70e+01)+	1.0212e+03(4.96e+01)+	2.0161e+02(1.71e+01)+	9.9829e+01(7.08e+00)+	1.4793e+01(3.45e+00)
WCCI20-MATP2-T8	**1.2866e+01(7.31e-01)-**	2.5467e+02(4.25e+01)+	1.1473e+03(3.43e+01)+	1.7604e+02(2.34e+01)+	1.1569e+02(3.02e+01)+	1.3914e+01(5.27e+00)
WCCI20-MATP2-T9	**1.2102e+01(1.07e+00)=**	2.4676e+02(3.58e+01)+	1.1630e+03(1.55e+01)+	1.9468e+02(2.56e+01)+	1.2751e+02(1.04e+01)+	1.3040e+01(6.20e+00)
WCCI20-MATP2-T10	1.3103e+01(8.14e-01)+	2.6898e+02(4.58e+01)+	8.6878e+02(4.43e+01)+	2.0514e+02(3.01e+01)+	1.2264e+02(2.32e+01)+	**1.1993e+01(5.88e+00)**
WCCI20-MATP2-T11	1.1966e+01(6.69e-01)=	2.8451e+02(7.57e+01)+	1.1609e+03(4.05e+01)+	2.1392e+02(4.04e+01)+	9.4661e+01(3.08e+01)+	**1.1964e+01(6.16e+00)**
WCCI20-MATP2-T12	**1.2371e+01(7.61e-01)=**	2.4145e+02(6.70e+01)+	9.9216e+02(4.39e+01)+	1.7033e+02(2.05e+01)+	1.1553e+02(2.69e+01)+	1.3581e+01(5.71e+00)
WCCI20-MATP2-T13	1.2858e+01(6.89e-01)+	2.6616e+02(5.48e+01)+	9.4290e+02(3.81e+01)+	1.9303e+02(5.01e+01)+	1.1452e+02(1.86e+01)+	**1.1645e+01(6.03e+00)**
WCCI20-MATP2-T14	1.2931e+01(9.64e-01)+	2.7544e+02(4.32e+01)+	9.4826e+02(3.73e+01)+	2.2372e+02(3.60e+01)+	1.1350e+02(2.59e+01)+	**1.1504e+01(5.69e+00)**
WCCI20-MATP2-T15	**1.2907e+01(4.37e-01)=**	3.2829e+02(8.93e+01)+	1.0730e+03(2.80e+01)+	1.7944e+02(2.33e+01)+	9.6986e+01(2.38e+01)+	1.3854e+01(5.30e+00)
WCCI20-MATP2-T16	1.2498e+01(1.31e+00)+	2.7782e+02(5.32e+01)+	1.1585e+03(4.51e+01)+	1.9992e+02(2.41e+01)+	1.1359e+02(2.53e+01)+	**8.9820e+00(6.26e+00)**
WCCI20-MATP2-T17	**1.3023e+01(9.21e-01)=**	2.6844e+02(3.59e+01)+	1.0532e+03(3.80e+01)+	1.9877e+02(3.75e+01)+	1.0952e+02(2.09e+01)+	1.5546e+01(5.51e+00)
WCCI20-MATP2-T18	**1.2360e+01(1.39e+00)-**	2.6502e+02(7.75e+01)+	1.0265e+03(1.88e+01)+	2.0216e+02(5.04e+01)+	9.8756e+01(1.88e+01)+	1.4689e+01(1.70e+00)
WCCI20-MATP2-T19	**1.2309e+01(1.67e+00)=**	2.6782e+02(2.93e+01)+	9.4187e+02(2.30e+01)+	2.1788e+02(4.34e+01)+	1.3129e+02(4.07e+01)+	1.4667e+01(5.37e+00)
WCCI20-MATP2-T20	**1.2094e+01(1.41e+00)=**	2.4604e+02(6.63e+01)+	1.1084e+03(4.66e+01)+	1.8251e+02(2.79e+01)+	1.1259e+02(2.48e+01)+	1.3563e+01(6.50e+00)
WCCI20-MATP2-T21	1.3414e+01(7.67e-01)=	2.6623e+02(3.66e+01)+	1.0321e+03(3.20e+01)+	2.1520e+02(2.52e+01)+	1.1367e+02(3.24e+01)+	**1.3236e+01(5.20e+00)**
WCCI20-MATP2-T22	1.3334e+01(9.98e-01)=	2.8459e+02(5.19e+01)+	1.0906e+03(2.92e+01)+	1.9556e+02(2.76e+01)+	1.1135e+02(2.47e+01)+	**1.3210e+01(6.68e+00)**
WCCI20-MATP2-T23	1.2344e+01(1.45e+00)+	2.9207e+02(4.61e+01)+	1.0276e+03(3.90e+01)+	1.8955e+02(4.62e+01)+	1.2055e+02(3.45e+01)+	**1.0892e+01(7.60e+00)**
WCCI20-MATP2-T24	1.2400e+01(1.22e+00)+	2.7922e+02(5.01e+01)+	1.2563e+03(2.39e+01)+	2.2341e+02(4.25e+01)+	1.1165e+02(1.95e+01)+	**1.0522e+01(6.97e+00)**
WCCI20-MATP2-T25	1.2804e+01(8.02e-01)=	2.8277e+02(7.49e+01)+	1.2516e+03(6.42e+01)+	2.0374e+02(2.68e+01)+	1.1252e+02(1.84e+01)+	**1.2354e+01(5.70e+00)**
WCCI20-MATP2-T26	1.2620e+01(1.07e+00)+	2.5611e+02(6.08e+01)+	1.2120e+03(4.84e+01)+	2.2124e+02(5.29e+01)+	1.1209e+02(4.28e+01)+	**1.1339e+01(8.37e+00)**
WCCI20-MATP2-T27	1.3157e+01(1.04e+00)=	2.3466e+02(5.78e+01)+	9.4745e+02(4.29e+01)+	2.0117e+02(3.11e+01)+	1.2056e+02(2.01e+01)+	**1.2056e+01(6.53e+00)**
WCCI20-MATP2-T28	**1.2572e+01(7.02e-01)=**	3.1183e+02(3.72e+01)+	1.0219e+03(3.17e+01)+	2.1367e+02(4.45e+01)+	1.2005e+02(2.41e+01)+	1.3964e+01(5.29e+00)
WCCI20-MATP2-T29	**1.2377e+01(1.08e+00)=**	2.7628e+02(5.19e+01)+	9.1173e+02(3.89e+01)+	1.9682e+02(2.47e+01)+	1.2696e+02(1.89e+01)+	1.3199e+01(4.78e+00)
WCCI20-MATP2-T30	**1.1937e+01(1.89e+00)-**	3.0606e+02(4.72e+01)+	1.1804e+03(4.24e+01)+	2.0291e+02(5.82e+01)+	1.1510e+02(1.83e+01)+	1.6673e+01(3.79e+00)
WCCI20-MATP2-T31	1.2339e+01(1.24e+00)+	2.8476e+02(4.67e+01)+	1.0011e+03(6.12e+01)+	2.0966e+02(2.92e+01)+	1.2376e+02(2.52e+01)+	**1.0371e+01(6.75e+00)**
WCCI20-MATP2-T32	**1.3523e+01(6.82e-01)-**	2.5129e+02(3.57e+01)+	1.1626e+03(5.41e+01)+	1.9674e+02(2.18e+01)+	1.1781e+02(3.09e+01)+	1.7450e+01(2.69e+00)
WCCI20-MATP2-T33	1.2678e+01(1.00e+00)=	2.6541e+02(2.45e+01)+	1.1914e+03(4.70e+01)+	2.0846e+02(2.24e+01)+	1.3124e+02(2.17e+01)+	**1.2032e+01(3.64e+00)**
WCCI20-MATP2-T34	**1.2867e+01(1.11e+00)=**	2.7746e+02(5.63e+01)+	1.0465e+03(3.63e+01)+	1.8957e+02(4.03e+01)+	1.2413e+02(1.74e+01)+	1.4820e+01(6.41e+00)
WCCI20-MATP2-T35	1.1955e+01(9.58e-01)=	2.5111e+02(3.63e+01)+	1.2256e+03(4.35e+01)+	1.9423e+02(3.04e+01)+	1.2452e+02(2.61e+01)+	**1.0443e+01(6.41e+00)**
WCCI20-MATP2-T36	**1.3353e+01(6.92e-01)=**	2.8654e+02(6.44e+01)+	1.1602e+03(4.18e+01)+	2.0006e+02(4.54e+01)+	1.1893e+02(2.65e+01)+	1.5034e+01(4.02e+00)
WCCI20-MATP2-T37	**1.2560e+01(1.19e+00)-**	2.6056e+02(7.00e+01)+	1.1696e+03(4.14e+01)+	2.1172e+02(3.21e+01)+	1.1574e+02(3.39e+01)+	1.7952e+01(3.88e+00)
WCCI20-MATP2-T38	1.2083e+01(7.20e-01)=	3.0270e+02(5.37e+01)+	1.1436e+03(5.05e+01)+	1.8871e+02(3.68e+01)+	1.1944e+02(3.05e+01)+	**1.0991e+01(8.12e+00)**
WCCI20-MATP2-T39	**1.2583e+01(1.07e+00)=**	2.7597e+02(7.80e+01)+	1.1161e+03(4.83e+01)+	1.9910e+02(2.13e+01)+	1.0549e+02(3.10e+01)+	1.2835e+01(6.65e+00)
WCCI20-MATP2-T40	1.2895e+01(9.46e-01)+	3.1148e+02(7.05e+01)+	1.0078e+03(3.58e+01)+	1.8860e+02(4.39e+01)+	1.2331e+02(1.66e+01)+	**1.0190e+01(6.75e+00)**
WCCI20-MATP2-T41	1.2755e+01(9.32e-01)=	2.8296e+02(7.26e+01)+	1.1124e+03(6.22e+01)+	1.9840e+02(3.15e+01)+	1.1494e+02(2.96e+01)+	**1.1922e+01(8.04e+00)**
WCCI20-MATP2-T42	1.1510e+01(1.62e+00)=	2.6860e+02(4.48e+01)+	9.3663e+02(1.86e+01)+	1.9588e+02(3.16e+01)+	1.2893e+02(1.95e+01)+	**1.0371e+01(6.75e+00)**
WCCI20-MATP2-T43	1.2105e+01(1.34e+00)+	2.6443e+02(4.19e+01)+	1.1974e+03(5.13e+01)+	2.0367e+02(2.41e+01)+	1.2970e+02(2.60e+01)+	**8.9123e+00(7.19e+00)**
WCCI20-MATP2-T44	1.2483e+01(1.15e+00)=	2.9058e+02(7.91e+01)+	1.3549e+03(4.90e+01)+	2.0270e+02(3.64e+01)+	1.2720e+02(3.82e+01)+	**1.1408e+01(6.35e+00)**
WCCI20-MATP2-T45	1.2589e+01(9.85e-01)=	2.9367e+02(3.77e+01)+	1.1082e+03(8.05e+01)+	1.9193e+02(3.00e+01)+	1.3400e+02(3.21e+01)+	**1.1363e+01(6.30e+00)**
WCCI20-MATP2-T46	1.2563e+01(1.13e+00)+	2.6836e+02(6.12e+01)+	1.0936e+03(5.64e+01)+	1.8215e+02(3.49e+01)+	1.2328e+02(2.35e+01)+	**7.3351e+00(5.99e+00)**
WCCI20-MATP2-T47	1.3034e+01(9.60e-01)=	2.7752e+02(6.71e+01)+	8.7571e+02(2.89e+01)+	2.0421e+02(2.77e+01)+	1.2159e+02(2.26e+01)+	**1.1147e+01(6.18e+00)**
WCCI20-MATP2-T48	1.2999e+01(9.06e-01)=	2.4019e+02(4.24e+01)+	1.0737e+03(3.61e+01)+	2.0693e+02(3.16e+01)+	1.1378e+02(3.09e+01)+	**1.0436e+01(6.72e+00)**
WCCI20-MATP2-T49	1.3300e+01(5.97e-01)+	2.8227e+02(6.70e+01)+	1.0864e+03(3.85e+01)+	1.9721e+02(1.65e+01)+	1.2025e+02(2.92e+01)+	**5.4502e+00(5.65e+00)**
WCCI20-MATP2-T50	1.2918e+01(1.14e+00)+	3.0242e+02(4.52e+01)+	3.8042e+02(1.67e+01)+	2.0351e+02(4.91e+01)+	1.0883e+02(2.16e+01)+	**9.3164e+00(6.89e+00)**

TABLE S. III: The Mean Values and Standard Deviations of IGD Statistical Results Obtained by MMTEA-DAKT with its Compared MMTEAs on Solving Task1–Task50 of MATP1-MATP5 Problems of WCCI2020

	MOMFEA-II	MTEA-D-DN	MOMFEA-SADE	EMT-ET	MTDE-MKTA	MMTEA-DAKT
WCCI20-MATP3-T1	3.0095e-02(1.28e-03)+	4.2504e-02(1.02e-02)+	1.5102e+00(2.22e-02)+	2.5387e-01(5.25e-02)+	7.1010e-03(1.11e-03)+	**6.4410e-03(1.18e-02)**
WCCI20-MATP3-T2	3.1015e-02(9.21e-04)+	3.7251e-02(1.09e-02)+	1.7177e+00(1.92e-02)+	1.8969e-01(2.85e-02)+	**6.8146e-03(1.76e-03)-**	6.8947e-03(1.20e-02)
WCCI20-MATP3-T3	3.1124e-02(1.11e-03)+	4.6799e-02(7.80e-03)+	1.7319e+00(1.61e-02)+	2.3502e-01(2.90e-02)+	7.8170e-03(1.96e-03)+	**5.7793e-03(1.19e-02)**
WCCI20-MATP3-T4	3.0751e-02(1.42e-03)+	3.5945e-02(1.17e-02)+	1.6296e+00(3.05e-02)+	2.4874e-01(6.05e-02)+	7.2832e-03(1.68e-03)+	**5.7686e-03(1.28e-02)**
WCCI20-MATP3-T5	3.1026e-02(1.26e-03)-	3.5642e-02(1.07e-02)=	1.6066e+00(1.81e-02)+	2.0289e-01(4.71e-02)+	**9.8998e-03(4.43e-03)-**	3.5732e-02(2.60e-03)
WCCI20-MATP3-T6	3.0689e-02(1.12e-03)+	3.7547e-02(9.90e-03)=	1.5549e+00(1.92e-02)+	2.2567e-01(2.91e-02)+	**7.6525e-03(1.84e-03)-**	3.0468e-02(1.15e-02)
WCCI20-MATP3-T7	3.0655e-02(1.02e-03)+	3.5169e-02(6.87e-03)+	1.6210e+00(2.41e-02)+	2.0587e-01(4.27e-02)+	6.8978e-03(1.54e-03)+	**1.8695e-03(1.63e-03)**
WCCI20-MATP3-T8	3.1186e-02(9.47e-04)+	3.9119e-02(1.12e-02)=	1.6245e+00(2.44e-02)+	1.9533e-01(3.79e-02)+	**7.8151e-03(3.04e-03)-**	2.9503e-02(1.31e-02)
WCCI20-MATP3-T9	3.1135e-02(1.01e-03)+	3.4847e-02(1.58e-02)=	1.8132e+00(4.83e-02)+	2.1869e-01(3.33e-02)+	**7.5950e-03(2.80e-03)=**	2.1298e-02(1.77e-02)
WCCI20-MATP3-T10	3.1344e-02(1.73e-03)+	3.4726e-02(1.10e-02)+	1.7395e+00(3.00e-02)+	1.8748e-01(3.91e-02)+	8.1872e-03(3.11e-03)+	**4.8958e-03(8.07e-03)**
WCCI20-MATP3-T11	3.0259e-02(1.70e-03)+	3.7731e-02(1.27e-02)+	1.6851e+00(3.88e-02)+	2.3880e-01(4.15e-02)+	**7.9292e-03(2.33e-03)=**	1.2757e-02(1.53e-02)
WCCI20-MATP3-T12	3.1125e-02(9.38e-04)+	4.2026e-02(1.15e-02)+	1.6552e+00(3.34e-02)+	2.4561e-01(3.67e-02)+	8.0507e-03(2.60e-03)+	**7.0013e-03(1.21e-02)**
WCCI20-MATP3-T13	3.0491e-02(9.47e-04)+	3.2704e-02(5.46e-03)+	1.6432e+00(3.08e-02)+	2.2005e-01(6.62e-02)+	9.4715e-03(2.44e-03)+	**5.8260e-03(1.18e-02)**
WCCI20-MATP3-T14	3.0643e-02(1.23e-03)+	4.1169e-02(2.27e-02)+	1.6295e+00(2.26e-02)+	2.2472e-01(5.10e-02)+	**6.5898e-03(5.83e-04)=**	7.7136e-03(1.24e-02)
WCCI20-MATP3-T15	2.9278e-02(1.77e-03)=	4.2219e-02(6.66e-03)+	1.4804e+00(1.29e-02)+	2.1303e-01(5.11e-02)+	**8.3924e-03(5.21e-03)=**	2.6004e-02(1.79e-02)
WCCI20-MATP3-T16	3.1572e-02(1.21e-03)-	4.0381e-02(1.45e-02)=	1.6105e+00(1.79e-02)+	2.0749e-01(4.19e-02)+	**8.1113e-03(2.95e-03)-**	3.2036e-02(1.42e-02)
WCCI20-MATP3-T17	3.1503e-02(1.01e-03)+	4.2862e-02(1.26e-02)+	1.6412e+00(2.21e-02)+	2.2303e-01(4.79e-02)+	8.0698e-03(2.10e-03)+	**6.0957e-03(1.33e-02)**
WCCI20-MATP3-T18	3.1005e-02(1.91e-03)-	4.1535e-02(1.19e-02)=	1.6083e+00(2.67e-02)+	2.2355e-01(3.15e-02)+	**7.8275e-03(2.04e-03)-**	3.1263e-02(1.39e-02)
WCCI20-MATP3-T19	3.0294e-02(1.67e-03)+	3.7935e-02(1.03e-02)=	1.5376e+00(1.87e-02)+	1.9946e-01(3.25e-02)+	**8.3716e-03(3.49e-03)-**	2.8855e-02(1.27e-02)
WCCI20-MATP3-T20	3.0488e-02(1.76e-03)-	4.0495e-02(1.06e-02)=	1.8360e+00(3.13e-02)+	2.0842e-01(2.92e-02)+	**8.3989e-03(9.77e-04)-**	3.1259e-02(1.39e-02)
WCCI20-MATP3-T21	3.0917e-02(9.80e-04)+	4.7918e-02(1.89e-02)+	1.6290e+00(2.64e-02)+	2.4088e-01(4.65e-02)+	**6.6457e-03(8.08e-04)-**	2.9961e-02(1.33e-02)
WCCI20-MATP3-T22	3.0976e-02(1.07e-03)+	4.3753e-02(1.04e-02)+	1.7495e+00(2.13e-02)+	2.3433e-01(4.82e-02)+	8.5181e-03(4.40e-03)+	**6.1720e-04(1.16e-03)**
WCCI20-MATP3-T23	3.1127e-02(1.55e-03)+	3.7316e-02(1.43e-02)+	1.7816e+00(2.09e-02)+	2.2350e-01(5.87e-02)+	7.2296e-03(1.22e-03)+	**6.4080e-03(1.19e-02)**
WCCI20-MATP3-T24	3.1459e-02(6.61e-04)+	4.1063e-02(1.39e-02)+	1.6385e+00(2.98e-02)+	2.2392e-01(3.34e-02)+	8.0467e-03(1.96e-03)+	**1.2167e-03(1.63e-03)**
WCCI20-MATP3-T25	2.9884e-02(2.54e-03)+	3.9432e-02(5.24e-03)+	1.4912e+00(2.41e-02)+	2.0974e-01(5.52e-02)+	6.7618e-03(7.82e-04)+	**3.5126e-03(6.15e-03)**
WCCI20-MATP3-T26	2.9984e-02(1.14e-03)-	5.1409e-02(1.73e-02)+	1.5941e+00(3.19e-02)+	2.1163e-01(3.93e-02)+	**6.5580e-03(8.01e-04)-**	3.5246e-02(2.95e-03)
WCCI20-MATP3-T27	3.1016e-02(1.02e-03)=	4.0284e-02(9.65e-03)=	1.6571e+00(2.25e-02)+	2.0508e-01(3.39e-02)+	**7.2944e-03(1.74e-03)=**	2.5408e-02(1.72e-02)
WCCI20-MATP3-T28	3.1164e-02(1.03e-03)+	3.8812e-02(1.34e-02)+	1.5769e+00(2.92e-02)+	1.8449e-01(3.97e-02)+	1.0507e-02(5.02e-03)+	**4.9313e-03(1.22e-02)**
WCCI20-MATP3-T29	3.1412e-02(1.14e-03)+	4.1668e-02(1.14e-02)+	1.6457e+00(2.67e-02)+	2.1173e-01(2.83e-02)+	6.5334e-03(5.30e-04)+	**5.9985e-03(1.20e-02)**
WCCI20-MATP3-T30	2.9981e-02(1.48e-03)=	3.5684e-02(1.24e-02)=	1.6295e+00(2.59e-02)+	2.0783e-01(4.33e-02)+	**7.1264e-03(1.82e-03)=**	2.5571e-02(1.68e-02)
WCCI20-MATP3-T31	3.1257e-02(9.89e-04)+	3.7802e-02(8.77e-03)=	1.5728e+00(1.73e-02)+	2.0428e-01(2.37e-02)+	**7.2845e-03(1.30e-03)-**	2.9824e-02(1.33e-02)
WCCI20-MATP3-T32	3.1154e-02(1.18e-03)+	3.9983e-02(7.50e-03)=	1.6558e+00(7.59e-03)+	2.4501e-01(3.82e-02)+	**6.4659e-03(7.49e-04)-**	3.0961e-02(1.33e-02)
WCCI20-MATP3-T33	3.0479e-02(1.45e-03)=	3.7634e-02(1.15e-02)=	1.6954e+00(2.17e-02)+	2.1358e-01(5.92e-02)+	**6.5236e-03(6.16e-04)=**	2.4908e-02(1.68e-02)
WCCI20-MATP3-T34	3.0628e-02(1.19e-03)=	3.7244e-02(7.95e-03)=	1.6823e+00(3.31e-02)+	1.9006e-01(3.89e-02)+	**9.5267e-03(3.91e-03)=**	2.4929e-02(1.69e-02)
WCCI20-MATP3-T35	3.0973e-02(1.13e-03)=	3.6217e-02(6.64e-03)=	1.5280e+00(1.60e-02)+	2.0735e-01(3.93e-02)+	**9.9442e-03(4.36e-03)=**	2.5970e-02(1.77e-02)
WCCI20-MATP3-T36	2.9826e-02(1.43e-03)+	5.5500e-02(1.95e-02)+	1.6406e+00(3.62e-02)+	2.1797e-01(7.56e-02)+	6.5641e-03(5.30e-04)+	**4.0856e-03(5.91e-03)**
WCCI20-MATP3-T37	3.0323e-02(1.69e-03)+	4.1644e-02(1.31e-02)=	1.5511e+00(1.12e-02)+	2.2038e-01(5.58e-02)+	**7.3548e-03(2.76e-03)-**	2.9440e-02(1.30e-02)
WCCI20-MATP3-T38	3.0338e-02(1.56e-03)-	5.5622e-02(2.12e-02)=	1.5336e+00(2.68e-02)+	2.2320e-01(4.06e-02)+	**6.5245e-03(5.86e-04)-**	3.3841e-02(5.56e-03)
WCCI20-MATP3-T39	3.0070e-02(2.17e-03)+	4.4770e-02(1.22e-02)+	1.5246e+00(2.26e-02)+	2.0547e-01(5.44e-02)+	**7.1598e-03(2.05e-03)=**	2.4968e-02(1.59e-02)
WCCI20-MATP3-T40	3.1150e-02(1.40e-03)+	3.9782e-02(1.25e-02)+	1.6473e+00(2.88e-02)+	2.1686e-01(3.44e-02)+	6.9794e-03(1.35e-03)+	**3.9693e-03(4.14e-03)**
WCCI20-MATP3-T41	3.1554e-02(7.95e-04)+	3.6344e-02(1.38e-02)+	1.6695e+00(2.54e-02)+	2.1572e-01(4.48e-02)+	7.4243e-03(7.39e-04)+	**6.4696e-03(1.18e-02)**
WCCI20-MATP3-T42	3.1084e-02(6.93e-04)+	4.4367e-02(1.36e-02)+	1.6303e+00(2.36e-02)+	2.1741e-01(5.86e-02)+	9.9295e-03(4.14e-03)+	**6.8097e-03(1.17e-02)**
WCCI20-MATP3-T43	3.0473e-02(1.77e-03)=	4.2427e-02(1.23e-02)=	1.6274e+00(3.28e-02)+	1.9227e-01(5.12e-02)+	**6.5206e-03(4.47e-04)-**	2.9714e-02(1.33e-02)
WCCI20-MATP3-T44	3.1056e-02(1.28e-03)+	3.9880e-02(1.11e-02)+	1.6087e+00(2.68e-02)+	2.0217e-01(5.61e-02)+	7.2131e-03(8.47e-04)+	**5.4411e-03(1.39e-02)**
WCCI20-MATP3-T45	3.2168e-02(4.94e-04)+	4.1706e-02(1.64e-02)+	1.6542e+00(2.82e-02)+	2.2510e-01(6.96e-02)+	8.0729e-03(2.41e-03)+	**2.8784e-03(4.52e-03)**
WCCI20-MATP3-T46	3.1878e-02(5.15e-04)+	4.0807e-02(1.31e-02)+	1.7442e+00(2.74e-02)+	1.9371e-01(2.76e-02)+	**7.1309e-03(9.27e-04)-**	7.8497e-03(1.46e-02)
WCCI20-MATP3-T47	3.1105e-02(1.44e-03)=	3.9163e-02(1.09e-02)=	1.6957e+00(1.70e-02)+	2.0781e-01(1.80e-02)+	**6.8951e-03(1.30e-03)-**	2.9089e-02(1.30e-02)
WCCI20-MATP3-T48	3.0309e-02(1.93e-03)+	3.6431e-02(6.22e-03)=	1.5830e+00(2.25e-02)+	2.0949e-01(4.13e-02)+	**6.6812e-03(7.68e-04)-**	2.8791e-02(1.27e-02)
WCCI20-MATP3-T49	3.0693e-02(1.08e-03)+	4.2290e-02(1.47e-02)+	1.8030e+00(2.57e-02)+	1.9406e-01(3.73e-02)+	**8.0028e-03(1.89e-03)=**	8.4917e-03(1.14e-02)
WCCI20-MATP3-T50	3.0811e-02(1.45e-03)+	3.2858e-02(1.64e-02)=	1.3726e-02(2.23e-03)=	1.8914e-01(5.89e-02)+	**1.0108e-02(7.17e-03)=**	1.5079e-02(1.85e-02)
WCCI20-MATP4-T1	3.5877e+00(5.94e-01)+	**3.9324e-02(7.87e-03)=**	2.1491e+04(1.72e+03)+	1.8312e+00(3.26e-01)+	6.1012e-01(9.88e-04)=	1.0989e+00(2.55e+00)
WCCI20-MATP4-T2	5.2087e+02(1.80e+02)+	1.3370e+02(9.37e+01)+	1.4328e+08(3.10e+07)+	3.6455e+03(7.49e+03)+	2.9671e+02(3.90e+02)+	**3.3503e+01(7.69e+01)**
WCCI20-MATP4-T3	1.6386e-01(8.90e-03)+	1.0784e+01(3.21e+00)+	1.9977e+01(3.01e-01)+	3.2112e+00(3.60e-01)+	1.7933e+00(1.34e+00)+	**1.3455e-01(6.37e-02)**
WCCI20-MATP4-T4	3.2061e+00(8.79e-01)-	**3.6370e-02(1.26e-02)-**	2.1384e+04(1.97e+03)+	2.0966e+00(3.90e-01)-	6.8459e-01(1.99e-01)-	3.8625e+00(1.02e+01)
WCCI20-MATP4-T5	9.9984e+02(9.46e+02)+	9.8600e+02(1.06e+03)+	7.8107e+07(1.02e+07)+	3.9591e+03(5.11e+03)+	2.3837e+02(1.56e+02)+	**6.2527e+01(4.43e+01)**
WCCI20-MATP4-T6	1.5610e-01(1.26e-02)+	6.8714e+00(3.57e+00)+	1.8992e+01(2.48e-01)+	3.1297e+00(4.35e-01)+	9.0697e-01(3.47e-01)+	**1.0518e-01(3.78e-02)**
WCCI20-MATP4-T7	3.8342e+00(1.02e+00)+	**3.3974e-02(4.06e-03)-**	2.0479e+04(1.20e+03)+	2.1959e+00(2.83e-01)+	6.2869e-01(4.87e-02)+	6.2046e-01(1.62e+00)
WCCI20-MATP4-T8	1.0475e+03(1.06e+03)+	**1.7736e+02(1.70e+02)=**	1.4036e+08(2.32e+07)+	1.6689e+03(1.52e+03)+	7.1198e+02(1.34e+03)+	4.8157e+02(1.18e+03)
WCCI20-MATP4-T9	1.6198e-01(1.11e-02)+	9.9370e+00(3.98e+00)+	1.9109e+01(1.94e-01)+	3.3082e+00(3.38e-01)+	1.4183e+00(8.74e-01)+	**1.3516e-01(1.43e-01)**
WCCI20-MATP4-T10	3.8889e+00(7.94e-01)+	**3.3469e-02(1.04e-02)=**	2.2931e+04(3.38e+03)+	1.7134e+00(2.90e-01)+	1.6926e+00(2.87e+00)=	5.9692e-01(6.53e-01)
WCCI20-MATP4-T11	6.2483e+02(2.15e+02)+	2.1750e+02(2.67e+02)+	1.0171e+08(1.17e+07)+	3.2484e+03(3.18e+03)+	3.3649e+02(3.90e+02)+	**1.5004e+01(2.08e+01)**
WCCI20-MATP4-T12	1.6279e-01(6.98e-03)+	9.3116e+00(4.00e+00)+	1.9890e+01(2.09e-01)+	3.2803e+00(3.34e-01)+	1.0075e+00(4.42e-01)+	**6.7121e-02(5.11e-02)**
WCCI20-MATP4-T13	3.5721e+00(6.18e-01)+	**4.2151e-02(1.53e-02)-**	2.3612e+04(1.86e+03)+	1.9039e+00(3.56e-01)+	6.6951e-01(1.58e-01)=	1.6036e+00(3.21e+00)
WCCI20-MATP4-T14	4.8416e+02(2.90e+02)+	4.5206e+02(8.11e+02)+	1.8675e+08(3.06e+07)+	1.1297e+03(7.41e+02)+	3.1905e+02(2.91e+02)+	**4.8886e+01(5.40e+01)**
WCCI20-MATP4-T15	1.5967e-01(1.10e-02)=	8.7561e+00(3.57e+00)+	1.9881e+01(1.37e-01)+	3.2183e+00(2.21e-01)+	1.3718e+00(8.46e-01)+	**1.4977e-01(3.51e-02)**
WCCI20-MATP4-T16	3.9866e+00(7.94e-01)+	**4.2736e-02(1.24e-02)=**	1.9375e+04(2.61e+03)+	2.0596e+00(4.68e-01)+	1.5753e+00(2.55e+00)=	5.5745e-01(6.82e-01)
WCCI20-MATP4-T17	7.5977e+02(5.25e+02)+	2.1482e+02(1.50e+02)+	1.5824e+08(1.95e+07)+	1.0795e+05(1.33e+05)+	8.5188e+02(1.93e+03)=	**5.2431e+01(5.64e+01)**
WCCI20-MATP4-T18	1.7210e-01(5.60e-03)+	1.2812e+01(1.87e+00)+	1.9863e+01(1.35e-01)+	3.0740e+00(2.82e-01)+	1.4928e+00(8.34e-01)+	**8.8083e-02(4.52e-02)**
WCCI20-MATP4-T19	3.8919e+00(1.28e+00)+	**4.1504e-02(1.04e-02)=**	2.2872e+04(2.42e+03)+	2.2254e+00(4.99e-01)+	6.1804e-01(2.24e-02)=	8.2509e-01(1.11e+00)
WCCI20-MATP4-T20	7.1163e+02(3.65e+02)+	2.0566e+02(1.82e+02)+	9.5348e+07(1.27e+07)+	1.1894e+03(9.09e+02)+	9.5340e+01(6.22e+01)=	**5.2837e+01(5.32e+01)**
WCCI20-MATP4-T21	1.6116e-01(1.43e-02)+	1.0016e+01(2.58e+00)+	1.9493e+01(3.39e-01)+	3.2554e+00(3.70e-01)+	1.1916e+00(5.90e-01)+	**5.8807e-02(3.73e-02)**
WCCI20-MATP4-T22	4.0073e+00(6.50e-01)-	**3.0217e-02(5.93e-03)-**	2.3565e+04(2.01e+03)+	2.0913e+00(5.11e-01)=	1.3216e+00(1.87e+00)=	4.6302e+00(9.67e+00)
WCCI20-MATP4-T23	1.1374e+03(7.21e+02)+	8.9004e+01(3.63e+01)+	1.4174e+08(8.81e+06)+	7.2730e+04(1.21e+05)+	1.7026e+02(2.04e+02)+	**6.3238e+00(6.74e+00)**
WCCI20-MATP4-T24	1.6243e-01(6.90e-03)+	9.0767e+00(3.42e+00)+	1.9551e+01(1.19e-01)+	3.2567e+00(5.20e-01)+	1.0575e+00(6.27e-01)+	**1.3094e-01(1.78e-01)**
WCCI20-MATP4-T25	3.8600e+00(9.58e-01)-	**3.4971e-02(1.18e-02)=**	2.1171e+04(1.45e+03)+	1.7604e+00(4.56e-01)=	6.1012e-01(1.03e-03)=	9.4530e+00(1.40e+01)
WCCI20-MATP4-T26	1.1953e+03(1.17e+03)+	3.7417e+02(5.50e+02)=	1.3899e+08(2.46e+07)+	2.1387e+03(1.37e+03)+	**2.6388e+02(4.01e+02)=**	3.8050e+02(7.82e+02)
WCCI20-MATP4-T27	1.6446e-01(7.52e-03)+	9.4436e+00(3.17e+00)+	1.9491e+01(1.22e-01)+	3.5300e+00(6.80e-01)+	1.0418e+00(7.69e-01)+	**7.1018e-02(4.64e-02)**
WCCI20-MATP4-T28	4.3460e+00(6.22e-01)+	**4.2284e-02(1.52e-02)=**	2.1108e+04(2.05e+03)+	1.9775e+00(5.26e-01)+	9.4745e-01(6.39e-01)+	3.0792e-01(3.80e-01)
WCCI20-MATP4-T29	7.7281e+02(4.63e+02)-	**1.7510e+02(2.11e+02)=**	1.7620e+08(2.09e+07)+	7.2250e+04(1.22e+05)+	5.4993e+02(9.36e+02)=	1.7942e+03(4.58e+03)
WCCI20-MATP4-T30	1.6742e-01(7.62e-03)+	9.1421e+00(4.11e+00)+	1.9457e+01(1.67e-01)+	3.2976e+00(4.62e-01)+	1.4183e+00(5.98e-01)+	**1.3519e-01(1.94e-01)**
WCCI20-MATP4-T31	3.5044e+00(6.45e-01)-	**3.7674e-02(1.39e-02)=**	2.5897e+04(1.80e+03)+	1.6872e+00(3.24e-01)=	6.3391e-01(5.98e-02)=	1.7890e+00(2.68e+00)
WCCI20-MATP4-T32	6.4989e+02(2.58e+02)+	1.0677e+03(9.38e+02)+	1.0941e+08(1.74e+07)+	1.5440e+03(2.04e+03)+	1.1366e+03(1.61e+03)+	**8.0062e+01(7.12e+01)**
WCCI20-MATP4-T33	1.6447e-01(1.19e-02)+	8.3859e+00(2.38e+00)+	1.9485e+01(2.01e-01)+	3.6223e+00(6.72e-01)+	7.8904e-01(4.48e-01)+	**6.8946e-02(3.67e-02)**
WCCI20-MATP4-T34	3.1856e+00(1.10e+00)=	**3.5534e-02(7.71e-03)=**	2.2732e+04(1.80e+03)+	1.7080e+00(6.85e-02)=	6.2599e-01(3.64e-02)=	3.0199e+00(3.22e+00)
WCCI20-MATP4-T35	6.9957e+02(5.39e+02)+	1.8196e+02(1.11e+02)=	1.7053e+08(3.14e+07)+	2.0125e+03(4.14e+03)+	3.8467e+02(3.41e+02)=	**1.1679e+02(1.26e+02)**
WCCI20-MATP4-T36	1.6400e-01(1.51e-02)+	9.7959e+00(3.50e+00)+	1.9200e+01(2.13e-01)+	3.1622e+00(4.48e-01)+	1.6192e+00(1.05e+00)+	**1.1187e-01(5.18e-02)**
WCCI20-MATP4-T37	4.3620e+00(1.18e+00)+	**4.0540e-02(9.45e-03)-**	2.4857e+04(2.32e+03)+	1.9429e+00(4.15e-01)=	6.5651e-01(1.15e-01)-	1.7365e+00(1.52e+00)
WCCI20-MATP4-T38	8.1375e+02(6.30e+02)+	2.5922e+02(1.59e+02)=	1.6965e+08(1.85e+07)+	8.8135e+02(4.91e+02)+	7.9703e+02(8.11e+02)+	**1.2365e+02(1.44e+02)**
WCCI20-MATP4-T39	1.7207e-01(7.18e-03)+	8.2679e+00(2.52e+00)+	1.9811e+01(1.48e-01)+	3.3983e+00(3.03e-01)+	7.1462e-01(2.38e-01)+	**1.0224e-01(3.37e-02)**
WCCI20-MATP4-T40	2.7842e+00(2.64e-01)-	**3.4652e-02(1.20e-02)-**	1.8178e+04(1.64e+03)+	1.8722e+00(3.39e-01)=	6.1403e-01(1.14e-02)=	3.9040e+00(4.22e+00)
WCCI20-MATP4-T41	1.5255e+03(1.09e+03)+	**1.1751e+02(5.71e+01)=**	1.2992e+08(2.10e+07)+	1.7131e+03(2.08e+03)+	9.0540e+01(5.89e+01)=	3.2895e+02(3.62e+02)
WCCI20-MATP4-T42	1.6937e-01(9.79e-03)+	1.1444e+01(4.59e+00)+	1.8513e+01(2.97e-01)+	3.0846e+00(6.20e-01)+	1.6639e+00(8.56e-01)+	**1.4610e-01(1.68e-01)**
WCCI20-MATP4-T43	3.1073e+00(9.03e-01)+	**3.0833e-02(9.19e-03)=**	1.8421e+04(2.81e+03)+	1.7434e+00(3.86e-01)=	6.2563e-01(3.53e-02)=	6.5957e-01(1.18e+00)
WCCI20-MATP4-T44	5.7640e+02(2.16e+02)+	7.9032e+02(7.69e+02)+	1.3092e+08(1.89e+07)+	9.6764e+02(4.93e+02)+	6.8282e+02(1.13e+03)+	**3.4496e+02(8.26e+02)**
WCCI20-MATP4-T45	1.6407e-01(7.56e-03)+	1.0194e+01(4.53e+00)+	1.9409e+01(1.60e-01)+	3.3091e+00(6.17e-01)+	1.1291e+00(4.77e-01)+	**8.2634e-02(4.97e-02)**
WCCI20-MATP4-T46	3.2717e+00(5.59e-01)-	**4.3652e-02(1.81e-02)=**	1.6637e+04(9.69e+02)+	2.1086e+00(4.94e-01)=	6.0988e-01(1.03e-03)=	2.6546e+01(6.89e+01)
WCCI20-MATP4-T47	1.0798e+03(9.74e+02)+	2.0642e+02(3.04e+02)=	1.1530e+08(1.79e+07)+	1.4992e+03(9.23e+02)=	**1.2638e+02(8.34e+01)=**	6.9191e+02(1.18e+03)
WCCI20-MATP4-T48	1.6804e-01(9.21e-03)+	9.0286e+00(4.24e+00)+	1.9865e+01(1.95e-01)+	3.3859e+00(2.69e-01)+	1.5763e+00(8.20e-01)+	**1.0768e-01(4.21e-02)**
WCCI20-MATP4-T49	3.2014e+00(6.46e-01)-	**3.5131e-02(8.38e-03)=**	2.0675e+04(1.82e+03)+	2.1042e+00(6.16e-01)=	8.0759e-01(5.23e-01)=	1.1762e+01(2.03e+01)
WCCI20-MATP4-T50	5.7522e+02(3.90e+02)+	3.8654e+02(6.13e+02)=	9.8498e+01(5.75e+01)=	5.9158e+03(1.37e+04)+	3.8354e+02(4.36e+02)=	**1.9252e+02(2.63e+02)**

TABLE S. III: The Mean Values and Standard Deviations of IGD Statistical Results Obtained by MMTEA-DAKT with its Compared MMTEAs on Solving Task1–Task50 of MATP1-MATP5 Problems of WCCI2020

	MOMFEA-II	MTEA-D-DN	MOMFEA-SADE	EMT-ET	MTDE-MKTA	MMTEA-DAKT
WCCI20-MATP5-T1	**1.6296e+01(1.42e+00)=**	1.0188e+03(2.94e+02)+	6.0952e+03(4.41e+02)+	2.6820e+02(4.06e+01)+	1.4574e+02(2.31e+01)+	1.9346e+01(8.68e+00)
WCCI20-MATP5-T2	4.4663e-02(1.55e-03)=	4.0830e-02(1.06e-02)=	7.2098e+00(4.20e-01)+	2.6980e-01(5.80e-02)+	6.1113e-01(3.09e-03)+	**3.2176e-02(3.56e-02)**
WCCI20-MATP5-T3	6.7279e-01(8.44e-02)+	3.8478e+01(4.94e+00)+	5.2166e+01(9.69e-01)+	2.3480e+01(2.61e+00)+	1.2732e+01(3.25e+00)+	**4.8329e-01(5.43e-02)**
WCCI20-MATP5-T4	**1.7477e+01(8.15e-01)-**	1.0597e+03(2.34e+02)+	5.0858e+03(4.15e+02)+	2.6610e+02(3.29e+01)+	1.3009e+02(3.32e+01)+	2.4519e+01(3.32e+00)
WCCI20-MATP5-T5	4.5790e-02(1.09e-03)+	3.6422e-02(7.40e-03)=	7.6975e+00(1.76e-01)+	2.4093e-01(3.38e-02)+	2.6597e-01(3.22e-01)=	**2.3882e-02(3.26e-02)**
WCCI20-MATP5-T6	7.5678e-01(9.03e-02)=	3.4697e+01(5.13e+00)+	5.2339e+01(3.11e+00)+	2.4840e+01(3.54e+00)+	1.0825e+01(3.15e+00)+	**6.1828e-01(3.54e-01)**
WCCI20-MATP5-T7	1.6648e+01(2.22e+00)=	1.1284e+03(1.69e+02)+	6.1390e+03(4.65e+02)+	2.4242e+02(2.77e+01)+	1.4046e+02(1.78e+01)+	**1.7663e+01(6.32e+00)**
WCCI20-MATP5-T8	4.5433e-02(1.09e-03)+	3.1474e-02(9.15e-03)=	6.9418e+00(3.59e-01)+	2.0483e-01(3.43e-02)+	2.6591e-01(3.22e-01)=	**3.0526e-02(2.24e-02)**
WCCI20-MATP5-T9	6.6862e-01(1.05e-01)=	3.4261e+01(2.59e+00)+	4.4906e+01(1.06e+00)+	2.4651e+01(4.48e+00)+	1.0234e+01(3.32e+00)+	**6.1243e-01(3.20e-01)**
WCCI20-MATP5-T10	1.5680e+01(8.45e-01)=	1.0187e+03(1.36e+02)+	5.6390e+03(3.83e+02)+	2.4521e+02(6.57e+01)+	1.5736e+02(1.49e+01)+	**1.5589e+01(1.63e+00)**
WCCI20-MATP5-T11	4.5216e-02(1.47e-03)+	3.9202e-02(1.30e-02)=	6.8037e+00(3.82e-01)+	2.2003e-01(5.47e-02)+	3.5344e-01(3.21e-01)=	**2.5248e-02(2.41e-02)**
WCCI20-MATP5-T12	6.8603e-01(1.14e-01)=	3.7554e+01(2.43e+00)+	5.1195e+01(1.01e+00)+	2.4693e+01(3.26e+00)+	9.1650e+00(2.83e+00)+	**5.6248e-01(1.99e-01)**
WCCI20-MATP5-T13	1.6785e+01(1.30e+00)=	9.0317e+02(2.14e+02)+	5.9603e+03(1.92e+02)+	2.4785e+02(4.28e+01)+	1.2745e+02(2.20e+01)+	**1.3481e+01(7.72e+00)**
WCCI20-MATP5-T14	4.5274e-02(1.48e-03)=	3.7893e-02(1.02e-02)=	6.9165e+00(5.44e-01)+	2.1696e-01(6.11e-02)+	3.5448e-01(3.25e-01)=	**3.2695e-02(2.29e-02)**
WCCI20-MATP5-T15	6.6678e-01(8.77e-02)+	3.5219e+01(2.91e+00)+	4.8682e+01(6.25e-01)+	2.1761e+01(4.18e+00)+	1.0595e+01(2.24e+00)+	**4.1339e-01(1.05e-01)**
WCCI20-MATP5-T16	1.5836e+01(1.73e+00)+	9.9839e+02(1.92e+02)+	5.0867e+03(4.16e+02)+	2.1984e+02(4.03e+01)+	1.5251e+02(4.46e+01)+	**1.3948e+01(1.20e+01)**
WCCI20-MATP5-T17	4.3695e-02(2.54e-03)+	3.4577e-02(1.23e-02)=	7.5683e+00(4.71e-01)+	2.0969e-01(2.37e-02)+	4.3758e-01(2.95e-01)=	**2.5257e-02(1.71e-02)**
WCCI20-MATP5-T18	7.3751e-01(8.99e-02)+	3.6137e+01(3.00e+00)+	5.1771e+01(1.60e+00)+	2.6517e+01(4.61e+00)+	1.2455e+01(4.06e+00)+	**5.1168e-01(7.13e-02)**
WCCI20-MATP5-T19	1.6476e+01(9.27e-01)=	8.4073e+02(1.90e+02)+	6.7436e+03(1.16e+03)+	2.4041e+02(4.46e+01)+	1.1728e+02(2.69e+01)+	**1.6400e+01(2.66e+00)**
WCCI20-MATP5-T20	4.4447e-02(2.73e-03)+	4.0119e-02(1.50e-02)+	5.7231e+00(3.84e-01)+	2.3980e-01(5.04e-02)+	1.8200e-01(2.92e-01)=	**1.9682e-02(1.83e-02)**
WCCI20-MATP5-T21	6.5358e-01(7.53e-02)+	3.5736e+01(4.12e+00)+	5.1376e+01(9.01e-01)+	2.4459e+01(4.28e+00)+	1.1521e+01(3.95e+00)+	**4.2273e-01(7.97e-02)**
WCCI20-MATP5-T22	**1.7059e+01(2.17e+00)=**	9.9866e+02(2.78e+02)+	5.5262e+03(4.73e+02)+	2.4000e+02(3.42e+01)+	1.1783e+02(1.23e+01)+	1.9288e+01(9.47e+00)
WCCI20-MATP5-T23	4.3757e-02(1.66e-03)+	3.9963e-02(1.39e-02)=	7.3270e+00(4.05e-01)+	2.2296e-01(6.94e-02)+	3.5433e-01(3.19e-01)+	**1.4953e-02(2.54e-02)**
WCCI20-MATP5-T24	6.8149e-01(1.18e-01)=	3.7603e+01(3.28e+00)+	5.3183e+01(2.47e+00)+	2.3937e+01(4.41e+00)+	1.0969e+01(1.87e+00)+	**6.8130e-01(3.67e-01)**
WCCI20-MATP5-T25	**1.5457e+01(1.70e+00)=**	9.3467e+02(2.95e+02)+	6.4457e+03(1.94e+02)+	2.6985e+02(7.85e+01)+	1.4911e+02(2.44e+01)+	1.6833e+01(1.27e+01)
WCCI20-MATP5-T26	4.4865e-02(1.33e-03)+	4.4910e-02(1.52e-02)=	6.0273e+00(4.82e-01)+	2.1115e-01(4.49e-02)+	4.3985e-01(2.94e-01)+	**2.9207e-02(2.72e-02)**
WCCI20-MATP5-T27	**6.5273e-01(6.52e-02)=**	3.8820e+01(2.74e+00)+	5.2308e+01(1.93e+00)+	2.3084e+01(4.72e+00)+	1.1583e+01(3.29e+00)+	7.8315e-01(2.76e-01)
WCCI20-MATP5-T28	**1.5900e+01(2.48e+00)=**	1.0499e+03(1.45e+02)+	6.1928e+03(4.52e+02)+	2.4110e+02(3.28e+01)+	1.6326e+02(2.15e+01)+	2.0549e+01(4.95e+00)
WCCI20-MATP5-T29	4.4035e-02(2.62e-03)+	3.7111e-02(4.32e-03)=	7.7373e+00(4.19e-01)+	2.3037e-01(4.32e-02)+	2.6947e-01(3.19e-01)=	**2.4455e-02(2.33e-02)**
WCCI20-MATP5-T30	7.1852e-01(8.93e-02)=	3.5634e+01(5.11e+00)+	5.2518e+01(9.67e-01)+	2.5613e+01(7.91e+00)+	1.0480e+01(3.28e+00)+	**5.8757e-01(2.10e-01)**
WCCI20-MATP5-T31	**1.7057e+01(1.65e+00)=**	9.8759e+02(2.10e+02)+	4.9400e+03(1.86e+02)+	2.6681e+02(6.94e+01)+	1.3063e+02(4.13e+01)+	1.8465e+01(2.48e+00)
WCCI20-MATP5-T32	4.4310e-02(1.81e-03)+	3.1560e-02(5.50e-03)=	6.8829e+00(4.63e-01)+	2.0871e-01(4.84e-02)+	4.4478e-01(2.99e-01)+	**2.1388e-02(2.00e-02)**
WCCI20-MATP5-T33	7.5256e-01(5.91e-02)=	3.7113e+01(3.79e+00)+	5.4880e+01(1.74e+00)+	2.4839e+01(3.90e+00)+	1.1755e+01(4.96e+00)+	**5.7803e-01(2.02e-01)**
WCCI20-MATP5-T34	1.6421e+01(9.71e-01)+	9.0901e+02(3.06e+02)+	6.9360e+03(5.26e+02)+	2.6674e+02(6.18e+01)+	1.3453e+02(1.98e+01)+	**1.3260e+01(1.00e+01)**
WCCI20-MATP5-T35	4.3898e-02(1.51e-03)+	3.8409e-02(1.19e-02)=	7.8662e+00(5.19e-01)+	2.2963e-01(3.23e-02)+	6.1189e-01(4.86e-03)+	**3.7058e-02(5.89e-03)**
WCCI20-MATP5-T36	7.0126e-01(7.66e-02)=	3.0938e+01(3.25e+00)+	4.5313e+01(1.36e+00)+	2.5222e+01(2.60e+00)+	1.0384e+01(4.20e+00)+	**6.1734e-01(3.02e-01)**
WCCI20-MATP5-T37	1.6296e+01(1.59e+00)=	8.7588e+02(3.71e+02)+	5.8405e+03(3.33e+02)+	2.3919e+02(2.42e+01)+	1.4714e+02(3.31e+01)+	**1.5327e+01(5.70e+00)**
WCCI20-MATP5-T38	4.3711e-02(1.97e-03)+	3.5028e-02(8.18e-03)=	6.2554e+00(3.46e-01)+	2.3306e-01(3.60e-02)+	2.6533e-01(3.24e-01)=	**1.5548e-02(1.89e-02)**
WCCI20-MATP5-T39	6.4360e-01(8.31e-02)+	3.7188e+01(4.67e+00)+	5.1419e+01(9.69e-01)+	2.4311e+01(2.06e+00)+	1.0859e+01(2.88e+00)+	**5.2760e-01(2.36e-01)**
WCCI20-MATP5-T40	1.6453e+01(2.49e+00)=	9.3028e+02(3.15e+02)+	4.9952e+03(3.56e+02)+	2.4957e+02(3.74e+01)+	1.4620e+02(1.99e+01)+	**1.6450e+01(6.78e+00)**
WCCI20-MATP5-T41	4.6279e-02(1.73e-03)+	4.2319e-02(6.68e-03)+	7.5244e+00(4.22e-01)+	2.3724e-01(8.45e-02)+	4.0316e-01(2.98e-01)+	**2.1869e-02(2.00e-02)**
WCCI20-MATP5-T42	6.6031e-01(7.27e-02)=	3.6643e+01(3.39e+00)+	5.5031e+01(9.04e-01)+	2.0258e+01(3.66e+00)+	1.2708e+01(2.38e+00)+	**6.2065e-01(3.03e-01)**
WCCI20-MATP5-T43	**1.5590e+01(2.11e+00)-**	1.0890e+03(3.10e+02)+	5.6155e+03(3.44e+02)+	2.6397e+02(5.23e+01)+	1.5398e+02(3.20e+01)+	2.3544e+01(3.30e+00)
WCCI20-MATP5-T44	4.2914e-02(1.63e-03)=	**3.3848e-02(1.34e-02)=**	7.1394e+00(4.40e-01)+	2.3100e-01(3.42e-02)+	4.3922e-01(2.95e-01)=	3.4394e-02(1.63e-02)
WCCI20-MATP5-T45	6.6793e-01(8.81e-02)+	3.4679e+01(9.70e-01)+	5.2919e+01(1.11e+00)+	2.3401e+01(3.40e+00)+	1.0129e+01(3.25e+00)+	**6.1856e-01(2.84e-01)**
WCCI20-MATP5-T46	**1.5461e+01(8.48e-01)=**	9.9191e+02(2.36e+02)+	6.2504e+03(5.42e+02)+	2.1073e+02(3.30e+01)+	1.4824e+02(1.98e+01)+	1.8191e+01(7.86e+00)
WCCI20-MATP5-T47	4.3639e-02(2.70e-03)+	3.5204e-02(9.59e-03)=	7.9408e+00(2.99e-01)+	2.3530e-01(5.24e-02)+	3.5464e-01(3.23e-01)=	**2.7816e-02(2.61e-02)**
WCCI20-MATP5-T48	7.6995e-01(8.97e-02)=	3.7598e+01(4.29e+00)+	5.0875e+01(6.99e-01)+	2.5140e+01(6.21e+00)+	1.0022e+01(4.08e+00)+	**7.0945e-01(4.37e-01)**
WCCI20-MATP5-T49	**1.5197e+01(1.68e+00)=**	1.0644e+03(3.27e+02)+	6.2030e+03(5.69e+02)+	2.4102e+02(3.64e+01)+	1.5256e+02(4.99e+01)+	1.5327e+01(9.84e+00)
WCCI20-MATP5-T50	4.5213e-02(2.28e-03)+	4.3163e-02(2.47e-02)=	6.0955e-01(4.60e-05)+	2.0730e-01(4.05e-02)+	3.5295e-01(3.21e-01)=	**1.8211e-02(2.25e-02)**
+ / - / =	120/57/73	141/55/54	247/3/0	193/53/4	137/44/69	

TABLE S. IV: The Average IGD Values of MMTEA-DAKT with Different Values of *rmp* in Solving All Problems

	rmp = 0.1	*rmp* = 0.3	*rmp* = 0.7	*rmp* = 0.9
CIHS1	1.75E-04	**1.74E-04**	1.78E-04	1.93E-04
CIHS2	**4.31E-04**	4.67E-04	5.99E-04	8.26E-04
CIMS1	**1.41E-04**	1.41E-04	1.41E-04	1.41E-04
CIMS2	1.76E-04	**1.74E-04**	1.74E-04	1.75E-04
CILS1	**1.88E-04**	2.24E-04	3.51E-04	1.66E-01
CILS2	**1.62E-04**	1.63E-04	1.64E-04	3.78E-03
PIHS1	**5.31E-04**	7.88E-04	1.02E-03	1.14E-01
PIHS2	**3.89E-03**	5.72E-03	1.34E-01	3.28E+00
PIMS1	**4.63E-04**	2.21E-03	2.64E-03	1.31E-02
PIMS2	1.93E+00	3.72E+00	**1.55E+00**	3.98E+00
PILS1	**3.72E-04**	6.43E-04	2.39E-03	3.35E-02
PILS2	**9.50E-04**	2.86E-03	4.31E-01	5.19E-01
NIHS1	**1.47E+00**	1.48E+00	1.51E+00	1.53E+00
NIHS2	**2.11E-04**	2.39E-04	2.23E-04	2.62E-04
NIMS1	**1.07E-01**	1.35E-01	1.58E-01	1.67E-01
NIMS2	1.88E-04	**1.66E-04**	1.68E-04	2.87E-04
NILS1	**8.39E-04**	8.79E-04	6.27E-03	1.07E-02
NILS2	6.32E-01	6.42E-01	**5.94E-01**	6.43E-01
CPLX1_1	2.36E-04	**2.34E-04**	2.43E-04	3.31E-04
CPLX1_2	4.17E-04	**3.86E-04**	1.04E-03	2.57E-03
CPLX2_1	**2.34E-04**	2.49E-04	2.42E-04	2.44E-04
CPLX2_2	1.18E-03	**7.63E-04**	1.27E-03	1.62E-03
CPLX3_1	**1.46E-03**	2.06E-03	2.98E-03	4.28E-03
CPLX3_2	**1.39E-03**	1.73E-03	2.54E-03	4.23E-03
CPLX4_1	**1.05E-03**	1.69E-03	2.04E-03	2.28E-03
CPLX4_2	**1.06E-03**	1.70E-03	2.13E-03	2.29E-03
CPLX5_1	**1.16E-03**	1.75E-03	2.43E-03	3.68E-03
CPLX5_2	**5.01E-03**	5.51E-03	5.46E-03	5.57E-03
CPLX6_1	**1.32E-03**	1.97E-03	2.61E-03	3.88E-03
CPLX6_2	**2.08E-03**	2.96E-03	3.95E-03	5.23E-03
CPLX7_1	**1.06E-03**	1.29E-03	1.79E-03	2.88E-03
CPLX7_2	**1.25E-03**	1.43E-03	1.61E-03	2.02E-03
CPLX8_1	**1.68E-03**	1.94E-03	2.33E-03	3.35E-03
CPLX8_2	**8.47E-04**	2.04E-03	1.01E-02	1.79E-02
CPLX9_1	5.18E-03	5.20E-03	**4.92E-03**	5.66E-03
CPLX9_2	**1.65E-03**	3.73E-03	4.25E-03	3.92E-03
CPLX10_1	**1.51E-03**	2.52E-03	5.83E-03	7.06E-03
CPLX10_2	**2.93E-03**	4.22E-03	6.67E-03	7.72E-03
ETMOF1_1	**6.19E-04**	6.55E-04	6.90E-04	7.45E-04
ETMOF1_2	1.50E-03	**1.43E-03**	1.71E-03	1.82E-03
ETMOF2_1	**3.66E-04**	4.41E-04	5.59E-04	8.60E-04
ETMOF2_2	**6.28E-03**	7.34E-03	7.97E-03	8.36E-03
ETMOF3_1	**2.23E-03**	2.91E-03	6.14E-03	8.12E-03
ETMOF3_2	**2.68E-03**	3.57E-03	4.79E-03	4.97E-03
ETMOF4_1	**3.34E+00**	3.74E+00	4.58E+00	2.10E+02
ETMOF4_2	**3.56E-01**	3.75E-01	3.58E-01	6.13E-01
ETMOF5_1	**2.50E-01**	2.69E-01	2.73E-01	2.62E-01
ETMOF5_2	3.37E-01	**3.08E-01**	8.44E-01	6.72E-01
ETMOF6_1	**5.37E-01**	1.02E+00	2.25E+01	3.99E+08
ETMOF6_2	**3.86E-02**	7.39E-02	1.08E+01	3.71E+01
ETMOF7_1	**5.75E-04**	1.98E-03	3.60E-03	1.31E-02
ETMOF7_2	**1.36E-02**	1.87E-02	2.32E-02	2.42E-01
ETMOF7_3	**1.86E-02**	2.19E-02	2.12E-02	2.24E-02
ETMOF8_1	7.98E-03	7.54E-03	**7.33E-03**	7.37E-03
ETMOF8_2	1.69E-03	1.76E-03	1.40E-03	**1.33E-03**
ETMOF8_3	1.21E-03	1.14E-03	9.74E-04	**9.52E-04**
Friedman rank	1.5	2.1	2.7	3.7

TABLE S. V: The Mean Values and Standard Deviations of IGD Statistical Results Obtained by MMTEA-DTS with MMTEA-DAKT in CEC2017.

	MMTEA-DTS	MMTEA-DAKT
CIHS1	1.76E-04(5.08E-06)+	**1.75E-04(1.59E-06)**
CIHS2	4.42E-04(7.70E-05)+	**4.31E-04(7.53E-05)**
CIMS1	1.45E-04(8.60E-08)=	**1.41E-04(2.55E-06)**
CIMS2	1.82E-04(1.53E-07)+	**1.76E-04(9.25E-06)**
CILS1	1.94E-04(8.13E-06)=	**1.88E-04(2.61E-05)**
CILS2	1.68E-04(1.52E-06)=	**1.62E-04(1.86E-06)**
PIHS1	5.50E-04(1.63E-04)+	**5.31E-04(5.54E-04)**
PIHS2	3.93E-03(5.41E-03)=	**3.89E-03(9.16E-03)**
PIMS1	1.45E-02(1.70E-02)+	**4.63E-04(1.71E-04)**
PIMS2	1.33E+01(3.76E+00)+	**1.93E+00(1.04E+00)**
PILS1	3.86E-04(1.46E-04)+	**3.72E-04(3.07E-04)**
PILS2	9.57E-04(3.50E-04)=	**9.50E-04(7.07E-04)**
NIHS1	1.48E+00(2.00E-02)=	**1.47E+00(1.83E-02)**
NIHS2	2.12E-04(1.72E-05)=	**2.11E-04(4.51E-05)**
NIMS1	1.12E-01(1.23E-02)=	**1.07E-01(7.43E-03)**
NIMS2	**1.79E-04(3.81E-05)-**	1.88E-04(8.13E-05)
NILS1	8.45E-04(2.12E-05)=	**8.39E-04(2.23E-05)**
NILS2	6.45E-01(1.32E-04)+	**6.32E-01(6.59E-02)**
+/-/=	8/1/9	

TABLE S. VI: The Mean Values and Standard Deviations of IGD Statistical Results Obtained by MMTEA-DTS with MMTEA-DAKT in CEC2019.

	MMTEA-DTS	MMTEA-DAKT
CPLX1_1	2.50E-04(2.54E-05)+	**2.36E-04(1.58E-05)**
CPLX1_2	**3.46E-04(2.10E-05)-**	4.17E-04(1.10E-04)
CPLX2_1	2.44E-04(1.96E-05)+	**2.34E-04(1.08E-05)**
CPLX2_2	7.17E-04(2.21E-04)-	1.18E-03(3.07E-04)
CPLX3_1	1.47E-03(4.21E-04)=	1.46E-03(4.70E-04)
CPLX3_2	1.45E-03(1.95E-04)+	1.39E-03(1.88E-04)
CPLX4_1	1.14E-03(2.04E-04)+	1.05E-03(9.69E-05)
CPLX4_2	1.15E-03(2.35E-04)+	1.06E-03(9.05E-05)
CPLX5_1	1.25E-03(1.65E-04)+	1.16E-03(1.60E-04)
CPLX5_2	5.30E-03(8.13E-04)+	5.01E-03(7.97E-04)
CPLX6_1	1.49E-03(1.92E-04)=	1.32E-03(2.82E-04)
CPLX6_2	1.99E-03(2.90E-04)=	2.08E-03(3.69E-04)
CPLX7_1	1.12E-03(1.59E-04)=	1.06E-03(1.46E-04)
CPLX7_2	1.34E-03(2.61E-04)+	1.25E-03(2.61E-04)
CPLX8_1	1.66E-03(2.39E-04)=	1.68E-03(2.77E-04)
CPLX8_2	8.15E-04(8.61E-04)-	8.47E-04(5.84E-04)
CPLX9_1	5.29E-03(5.13E-04)+	5.18E-03(6.55E-04)
CPLX9_2	1.91E-03(2.82E-04)+	1.65E-03(3.17E-04)
CPLX10_1	1.39E-03(7.85E-04)-	1.51E-03(9.01E-04)
CPLX10_2	2.52E-03(8.74E-04)-	2.93E-03(1.23E-03)
+/-/=	10/5/5	

TABLE S. VII: The Mean Values and Standard Deviations of IGD Statistical Results Obtained by MMTEA-DTS with MMTEA-DAKT in CEC2021.

	MMTEA-DTS	MMTEA-DAKT
ETMOF1_1	6.52E-04(5.95E-05)+	**6.19E-04(5.68E-05)**
ETMOF1_2	**1.41E-03(1.21E-04)-**	1.50E-03(2.09E-04)
ETMOF2_1	3.79E-04(3.56E-05)=	**3.66E-04(3.59E-05)**
ETMOF2_2	7.34E-03(3.14E-04)+	**6.28E-03(2.78E-04)**
ETMOF3_1	**1.95E-03(4.05E-04)-**	2.23E-03(4.18E-04)
ETMOF3_2	2.84E-03(5.18E-04)=	**2.68E-03(3.39E-04)**
ETMOF4_1	**2.78E+00(2.65E+00)-**	3.34E+00(2.04E+00)
ETMOF4_2	3.47E-01(5.89E-02)+	**3.56E-01(4.00E-02)**
ETMOF5_1	2.66E-01(2.68E-03)+	**2.50E-01(5.63E-02)**
ETMOF5_2	**2.34E-01(2.58E-02)-**	3.37E-01(5.43E-02)
ETMOF6_1	6.65E-01(2.01E-01)+	**5.37E-01(1.99E-01)**
ETMOF6_2	4.27E-02(3.41E-02)+	**3.86E-02 (1.99E-02)**
ETMOF7_1	1.69E-03(1.22E-03)+	**5.75E-04(2.91E-04)**
ETMOF7_2	1.87E-02(6.44E-03)+	**1.36E-02(2.90E-03)**
ETMOF7_3	2.18E-02(3.33E-03)+	**1.86E-02(3.15E-03)**
ETMOF8_1	7.58E-03(8.01E-04)+	**7.98E-03(6.51E-04)**
ETMOF8_2	1.99E-03(2.00E-04)+	**1.69E-03(1.34E-04)**
ETMOF8_3	1.29E-03(8.99E-05)+	**1.21E-03(5.16E-05)**
+/-/=	13/3/2	

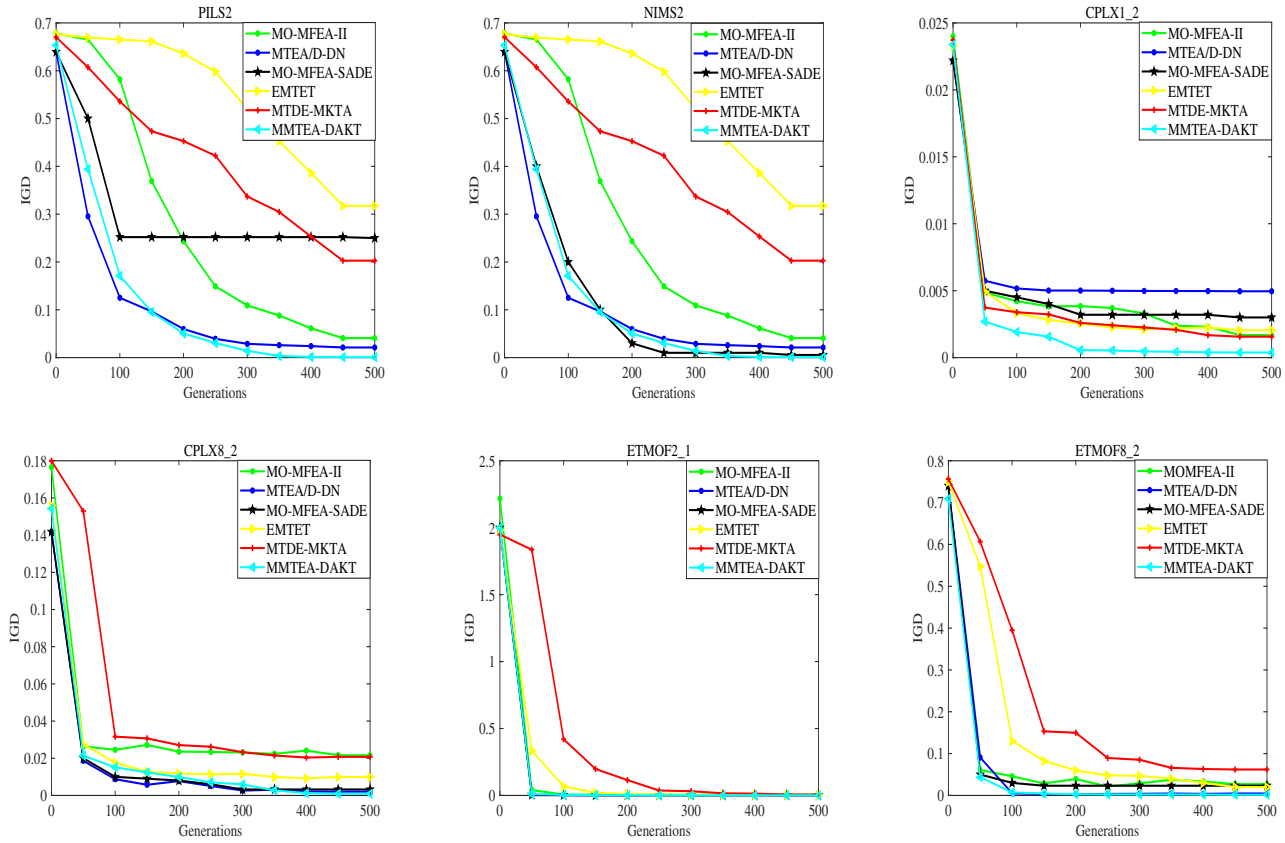

Fig. S. 1: The convergence profiles of all compared algorithms on PILS2, NIMS2, CPLX1_2, CPLX8_2, ETMOF2_1, and ETMOF8_2.

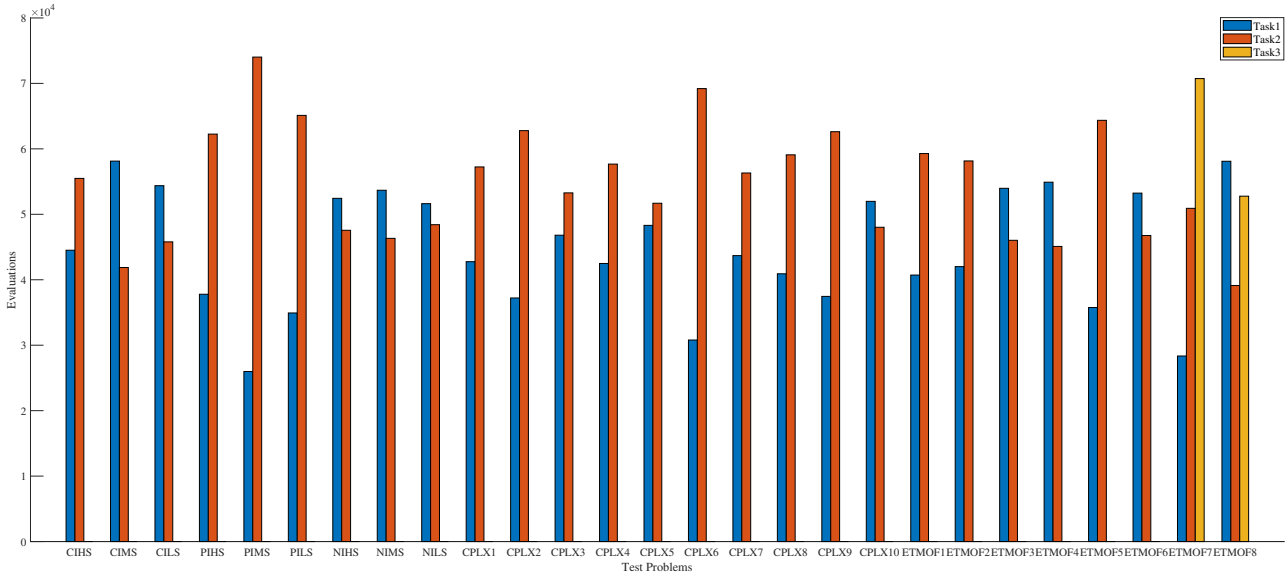

Fig. S. 2: Difference of computational resources for all tasks.