

# Evolutionary Multi-task Optimization with Adaptive Knowledge Transfer (Supplementary Material)

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**Abstract**—This document provides supplementary information for the main article. It includes the details of the three test suites used in the experiments and the tables of performance evaluation and comparison results referred to but not included in the main article.

## S.I. DETAILS OF TEST SUITES 1, 2 AND 3

The three test suites used in the experiments are generated from the following basic test problems with their search spaces and global optima denoted by  $\mathbf{O}$  (in terms of minimization) provided:

(1) Sphere:

$$f(\mathbf{x}) = \sum_{i=1}^D x_i^2. \quad (1)$$

$$\mathbf{x} \in [-100, 100]^D; \mathbf{O} = (0, \dots, 0).$$

(2) Rosenbrock:

$$f(\mathbf{x}) = \sum_{i=1}^{D-1} [100(x_i^2 - x_{i+1})^2 + (x_i - 1)^2]. \quad (2)$$

$$\mathbf{x} \in [-50, 50]^D; \mathbf{O} = (1, \dots, 1).$$

(3) Ackley:

$$f(\mathbf{x}) = -20 \exp(-0.2 \sqrt{\frac{1}{D} \sum_{i=1}^D x_i^2}) - \exp(\frac{1}{D} \sum_{i=1}^D \cos(2\pi x_i)) + 20 + \exp(1). \quad (3)$$

$$\mathbf{x} \in [-50, 50]^D; \mathbf{O} = (0, \dots, 0).$$

(4) Griewank:

$$f(\mathbf{x}) = \sum_{i=1}^D \frac{x_i^2}{4000} - \prod_{i=1}^D \cos(\frac{x_i}{\sqrt{i}}) + 1. \quad (4)$$

$$\mathbf{x} \in [-100, 100]^D; \mathbf{O} = (0, \dots, 0).$$

(5) Weierstrass:

$$f(\mathbf{x}) = \sum_{i=1}^D (\sum_{k=0}^{k_{max}} k_{max} [a^k \cos(2\pi b^k (x_i + 0.5))]) - D \sum_{k=0}^{k_{max}} [a^k \cos(2\pi b^k \cdot 0.5)], \quad (5)$$

$$a = 0.5, b = 3, k_{max} = 20.$$

$$\mathbf{x} \in [-0.5, 0.5]^D; \mathbf{O} = (-0.4, \dots, -0.4).$$

(6) Rastrigin:

$$f(\mathbf{x}) = 10D + \sum_{i=1}^D [x_i^2 - 10 \cos(2\pi x_i)]. \quad (6)$$

$$\mathbf{x} \in [-50, 50]^D; \mathbf{O} = (0, \dots, 0).$$

(7) Schwefel:

$$f(\mathbf{x}) = 418.9829 \times D - \sum_{i=1}^D x_i \sin(|x_i|^{\frac{1}{2}}) \quad (7)$$

$$\mathbf{x} \in [-500, 500]^D; \mathbf{O} = (420.9687, \dots, 420.9687).$$

Table S1 summarises the nine MTO problems in test suite1. Further details about these problems can be referred to in [1]. Table S2 describes the MaTDE problem proposed in [2] which contains 10 component tasks with purposely-designed inter-task helpfulness. Further details about this problem can be referred to in [2]. Table S3 details the four ManyTask10 problems, i.e., ManyTask10-zero, ManyTask10-small, ManyTask10-medium and ManyTask10-large designed by us. Each of these four problems contains two groups of five tasks, where the tasks within the same group have more similar global optima than those from different groups. The four problems mainly differ in the degree of dissimilarity of the global optima of the tasks within the same group. From “zero” and “small” to “medium” and “large”, the degree of dissimilarity increases, achieved by increasing the amount of random perturbation from a common centroid that corresponds to a specific group. Notably, different basic test problems may have different search spaces, and therefore the global optimum generated for each component task in a common range of  $[0, 1]$  will be linearly transformed to match the search space of the basic problem from which the corresponding component task is created. Table S4 summarises the six MTO problems with 50 component tasks at 50D in test suite 3, which are taken from the test bed used in the CEC 2019 Competition on

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Evolutionary Multi-Task Optimization. Further details about these problems can be found at [http://www.bdsc.site/websites/MTO\\_competiton\\_2019/MTO\\_Competition\\_CEC\\_2019.html](http://www.bdsc.site/websites/MTO_competiton_2019/MTO_Competition_CEC_2019.html).

## S.II. DETAILS OF PERFORMANCE EVALUATION AND COMPARISON RESULTS

Tables S5-S19 report the performance evaluation and comparison results which have been referred to but not included in the main article due to space limitation.

## REFERENCES

- [1] B. Da, Y.-S. Ong, L. Feng, A. K. Qin, A. Gupta, Z. Zhu, C.-K. Ting, K. Tang, and X. Yao, "Evolutionary multitasking for single-objective continuous optimization: Benchmark problems, performance metric, and baseline results," *arXiv preprint arXiv:1706.03470*, 2017.
- [2] Y. Chen, J. Zhong, L. Feng, and J. Zhang, "An adaptive archive-based evolutionary framework for many-task optimization," *IEEE Transactions on Emerging Topics in Computational Intelligence*, pp. 3870–3876, 2019.

TABLE S1: Description of the nine MTO problems [1] in test suite 1. The degree of the global optima interaction and the inter-task similarity (measured via Spearman’s rank correlation coefficient) are used to measure task relatedness. “CI”, “PI”, and “NI” denote the complete, partial, and no intersection of the global optima of two component tasks, respectively. “HS”, “MS”, and “LS” denote the high, medium, and low inter-task similarity between two component tasks, respectively.

Problem (Category)	Component Task	Global Optimum ( $\mathbf{O}$ )	Inter-task Similarity
1 (CI+HS)	1: Griewank	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-100, 100]^D, D = 50$	1.0000
	2: Rastrigin	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	
2 (CI+MS)	1: Ackley	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	0.2261
	2: Schwefel	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	
3 (CI+LS)	1: Ackley	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (42.096, 42.096, \dots, 42.096)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	0.0002
	2: Schwefel	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (420.96, 420.96, \dots, 420.96)$ $\mathbf{x} \in [-500, 500]^D, D = 50$	
4 (PI+HS)	1: Rastrigin	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	0.8670
	2: Sphere	$\mathbf{O} = \begin{cases} (o_1, o_2, \dots, o_{25}) = (0, 0, \dots, 0) \\ (o_{26}, o_{27}, \dots, o_{50}) = (20, 20, \dots, 20) \end{cases}$ $\mathbf{x} \in [-100, 100]^D, D = 50$	
5 (PI+MS)	1: Ackley	$\mathbf{O} = \begin{cases} (o_1, o_2, \dots, o_{25}) = (0, 0, \dots, 0) \\ (o_{26}, o_{27}, \dots, o_{50}) = (1, 1, \dots, 1) \end{cases}$ $\mathbf{x} \in [-50, 50]^D, D = 50$	0.2154
	2: Rosenbrock	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (1, 1, \dots, 1)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	
6 (PI+LS)	1: Ackley	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	0.0725
	2: Weierstrass	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-0.5, 0.5]^D, D = 25$	
7 (NI+HS)	1: Rosenbrock	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (1, 1, \dots, 1)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	0.9434
	2: Rastrigin	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	
8 (NI+MS)	1: Griewank	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (10, 10, \dots, 10)$ $\mathbf{x} \in [-100, 100]^D, D = 50$	0.3669
	2: Weierstrass	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	
9 (NI+LS)	1: Rastrigin	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	0.0016
	2: Schwefel	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (420.968, 420.968, \dots, 420.968)$ $\mathbf{x} \in [-500, 500]^D, D = 50$	

TABLE S2: Description of the 10 component tasks of the MaTDE-problem [2] in test suite 2. The 10 component tasks are grouped into two categories, i.e., four easy tasks (denoted by E-task) and six complex tasks (denoted by C-task). Those easy tasks designed to assist solving a complex task (via the intersection of global optima) are indicated in the last column.

Component Task	Global Optimum ( $\mathbf{O}$ )	Category	Ideal Assisting Task
1: <i>Sphere</i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (0, 0, \dots, 0)$ $\mathbf{x} \in [-100, 100]^D, D = 50$	E-task	None
2: <i>Sphere</i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (80, 80, \dots, 80)$ $\mathbf{x} \in [-100, 100]^D, D = 50$	E-task	None
3: <i>Sphere</i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (-80, -80, \dots, -80)$ $\mathbf{x} \in [-100, 100]^D, D = 50$	E-task	None
4: <i>Weierstrass<sub>25D</sub></i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (-0.4, -0.4, \dots, -0.4)$ $\mathbf{x} \in [-0.5, 0.5]^D, D = 25$	E-task	None
5: <i>Rosenbrock</i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (1, 1, \dots, 1)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	C-task	1
6: <i>Ackley</i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (40, 40, \dots, 40)$ $\mathbf{x} \in [-50, 50]^D, D = 50$	C-task	2
7: <i>Weierstrass<sub>50D</sub></i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (-0.4, -0.4, \dots, -0.4)$ $\mathbf{x} \in [-0.5, 0.5]^D, D = 50$	C-task	3,4
8: <i>Schweifel</i>	$\mathbf{O} = (o_1, o_2, \dots, o_D) = (420.9687, 420.9687, \dots, 420.9687)$ $\mathbf{x} \in [-500, 500]^D, D = 50$	C-task	None
9: <i>Griewank</i>	$\mathbf{O} = \begin{cases} (o_1, o_2, \dots, o_{25}) = (-80, -80, \dots, -80) \\ (o_{26}, o_{27}, \dots, o_{50}) = (80, 80, \dots, 80) \end{cases}$ $\mathbf{x} \in [-100, 100]^D, D = 50$	C-task	4
10: <i>Rastrigin</i>	$\mathbf{O} = \begin{cases} (o_1, o_2, \dots, o_{25}) = (80, 80, \dots, 80) \\ (o_{26}, o_{27}, \dots, o_{50}) = (-80, -80, \dots, -80) \end{cases}$ $\mathbf{x} \in [-50, 50]^D, D = 50$	C-task	None

TABLE S3: Description of our proposed ManyTask10-zero, ManyTask10-small, ManyTask10-medium and ManyTask10-large problems in test suite 2. For each problem, there are two groups of five tasks, where the global optima of all tasks in the same group are generated via a random perturbation around a common centroid and the centroids of the two groups are well separated from each other. Here, the centroids of two groups are set to  $[0.25, \dots, 0.25]$  and  $[0.75, \dots, 0.75]$  for each component task, and the random perturbation amount  $r_i$  along each problem dimension  $i \in \{1, \dots, D\}$  are defined in  $[0, 1]$  and linearly transformed to match the search space of the basic problem from which the corresponding component task is created.  $U(*, *)$  stands for a uniform distribution.

Problem	Component Task		Global Optimum $\mathcal{O}$	
ManyTask10-zero	Group 1	1: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i = 0$
		2: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i = 0$
		3: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.25) * 1000 - 500, i = 1, \dots, D$ $r_i = 0$
		4: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.25) * 200 - 100, i = 1, \dots, D$ $r_i = 0$
		5: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i = 0$
	Group 2	6: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i = 0$
		7: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i = 0$
		8: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 500, i = 1, \dots, D$ $r_i = 0$
		9: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.75) * 200 - 100, i = 1, \dots, D$ $r_i = 0$
		10: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i = 0$
ManyTask10-small	Group 1	1: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		2: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		3: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.25) * 1000 - 500, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		4: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.25) * 200 - 100, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		5: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
	Group 2	6: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		7: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		8: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.75) * 1000 - 500, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		9: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.75) * 200 - 100, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
		10: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.005, 0.005)$
ManyTask10-small	Group 1	1: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		2: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		3: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.25) * 1000 - 500, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		4: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.25) * 200 - 100, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		5: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
	Group 2	6: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		7: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		8: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.75) * 1000 - 500, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		9: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.75) * 200 - 100, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
		10: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.025, 0.025)$
ManyTask10-large	Group 1	1: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		2: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		3: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.25) * 1000 - 500, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		4: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.25) * 200 - 100, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		5: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.25) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
	Group 2	6: Rosenbrock	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		7: Ackley	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		8: Schwefel	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-500, 500]^D; D = 50$	$o_i = (r_i + 0.75) * 1000 - 500, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		9: Griewank	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-100, 100]^D; D = 50$	$o_i = (r_i + 0.75) * 200 - 100, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$
		10: Rastrigin	$\mathcal{O} = (o_1, \dots, o_D)$ $\mathbf{x} \in [-50, 50]^D; D = 50$	$o_i = (r_i + 0.75) * 100 - 50, i = 1, \dots, D$ $r_i \sim U(-0.05, 0.05)$

TABLE S4: Description of the six MTO problems with 50 component tasks at 50D in test suite 3. Each of the six problems is generated on top of a unique basic problem at 50D, where 50 component tasks therein are created by applying different global optimum shifting vectors and search space rotation matrices to the basic problem.

Problem	Component Task	Global Optimum and Rotation Matrix
1	1: Rosenbrock 2: Rosenbrock ... 50: Rosenbrock	The 50 component tasks in each problem are created by applying different global optimum shifting vectors and search space rotation matrices to the basic problem corresponding to that problem.
2	1: Ackley 2: Ackley ... 50: Ackley	
3	1: Rastrgin 2: Rastrgin ... 50: Rastrgin	
4	1: Griewank 2: Griewank ... 50: Griewank	
5	1: Weierstrass 2: Weierstrass ... 50: Weierstrass	
6	1: Schwefel 2: Schwefel ... 50: Schwefel	

TABLE S6: Comparison of AEMTO and AEMTO (w/o aSel) in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in MaTDE-problem. The last row shows a summary of statistically comparing AEMTO (w/o aTsf) with AEMTO (control method) via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 10 component tasks in MaTDE-problem.

Component Task	AEMTO	AEMTO (w/o aSel)
1	0.00E+00 (0.00E+00)	2.78E-03 (1.33E-03)
2	0.00E+00 (0.00E+00)	4.12E-03 (2.40E-03)
3	0.00E+00 (0.00E+00)	1.96E-03 (1.40E-03)
4	4.62E-05 (2.56E-05)	1.54E-02 (5.63E-03)
5	0.00E+00 (0.00E+00)	5.35E+00 (1.44E+01)
6	9.00E-07 (3.00E-07)	1.90E-02 (6.55E-03)
7	3.14E-04 (8.41E-05)	3.42E-01 (6.74E-02)
8	4.76E-04 (2.05E-04)	3.83E-03 (2.86E-03)
9	1.04E-05 (4.88E-06)	1.03E-05 (4.45E-06)
10	3.77E+02 (1.34E+01)	3.78E+02 (1.30E+01)
t/w/l	–	2/0/8

TABLE S5: Comparison of AEMTO and AEMTO (w/o aTsf) in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task of each MTO problem in test suite 1. The last row shows a summary of statistically comparing AEMTO (w/o aTsf) with AEMTO (control method) via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 18 component tasks from all nine MTO problems in test suite 1.

Problem	Component Task	AEMTO	AEMTO (w/o aTsf)
1	1	0.00E+00 (0.00E+00)	1.48E-05 (1.19E-05)
	2	2.00E-05 (2.43E-05)	2.45E-02 (1.87E-02)
2	1	2.55E-06 (2.11E-06)	9.86E-04 (5.40E-04)
	2	0.00E+00 (0.00E+00)	8.01E-04 (8.43E-04)
3	1	2.01E+01 (4.61E+00)	2.12E+01 (4.29E-02)
	2	6.94E+03 (1.69E+03)	9.20E+03 (5.26E+02)
4	1	4.02E+02 (2.62E+01)	4.13E+02 (2.01E+01)
	2	3.64E-04 (1.73E-04)	3.64E-02 (1.60E-02)
5	1	1.05E-03 (5.89E-04)	1.14E-02 (2.89E-03)
	2	8.48E+01 (5.59E-01)	8.70E+01 (4.20E-01)
6	1	4.26E-02 (2.16E-02)	6.24E-01 (2.27E-01)
	2	1.52E-02 (5.22E-03)	7.22E-02 (1.80E-02)
7	1	4.99E+01 (1.54E+01)	4.79E+01 (7.02E-01)
	2	1.55E+01 (6.50E+01)	8.05E-01 (1.07E+00)
8	1	4.04E-03 (4.26E-03)	1.13E-02 (8.04E-03)
	2	2.15E+00 (1.03E-01)	2.92E+00 (1.70E-01)
9	1	4.01E+02 (1.17E+01)	4.12E+02 (1.83E+01)
	2	1.30E+04 (9.67E+02)	1.29E+04 (5.55E+02)
t/w/l		–	5/1/12

TABLE S7: Comparison of AEMTO and AEMTO (w/o aSel) in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in each of the four ManyTask10 problems, i.e., zero, small, medium and large. For each of the four problems, a summary of statistically comparing AEMTO (w/o aSel) with AEMTO (control method) via Wilcoxon’s rank-sum test, with the result represented by (“t/w/l”), over all 10 component tasks is provided.

Problem	Component Task	AEMTO	AEMTO (w/o aSel)
ManyTask10 (zero)	1	0.00E+00 (0.00E+00)	1.88E+01 (2.30E+01)
	2	0.00E+00 (0.00E+00)	5.02E-03 (2.77E-03)
	3	0.00E+00 (0.00E+00)	1.25E-03 (1.20E-03)
	4	0.00E+00 (0.00E+00)	1.09E-05 (1.03E-05)
	5	0.00E+00 (0.00E+00)	1.83E-02 (1.69E-02)
	6	0.00E+00 (0.00E+00)	8.10E-02 (1.83E-01)
	7	0.00E+00 (0.00E+00)	3.68E-03 (2.43E-03)
	8	0.00E+00 (0.00E+00)	8.18E-04 (1.19E-03)
	9	0.00E+00 (0.00E+00)	6.70E-06 (8.91E-06)
	10	0.00E+00 (0.00E+00)	1.14E-02 (1.52E-02)
	t/w/l	–	0/0/10
ManyTask10 (small)	1	5.39E+01 (3.34E+01)	5.19E+01 (1.29E+01)
	2	1.37E-03 (3.84E-04)	9.43E-03 (2.15E-03)
	3	6.24E-05 (2.24E-05)	3.35E-03 (1.87E-03)
	4	6.00E-07 (4.90E-07)	2.27E-05 (9.19E-06)
	5	2.09E+02 (1.17E+01)	2.53E+02 (7.71E+00)
	6	4.03E+01 (1.39E+01)	4.71E+01 (2.46E+00)
	7	1.53E-03 (4.96E-04)	1.16E-02 (3.93E-03)
	8	7.03E-05 (3.48E-05)	2.48E-03 (1.15E-03)
	9	4.00E-07 (4.90E-07)	2.51E-05 (9.75E-06)
	10	1.91E+02 (9.03E+00)	2.24E+02 (1.41E+01)
	t/w/l	–	0/1/9
ManyTask10 (medium)	1	5.13E+01 (1.80E+01)	5.42E+01 (1.85E+01)
	2	3.54E-03 (5.97E-04)	1.02E-02 (2.99E-03)
	3	3.24E-04 (2.03E-04)	3.57E-03 (1.73E-03)
	4	2.70E-06 (1.62E-06)	3.65E-05 (1.45E-05)
	5	3.43E+02 (1.14E+01)	4.00E+02 (1.00E+01)
	6	4.67E+01 (9.77E-01)	5.34E+01 (1.80E+01)
	7	3.79E-03 (6.30E-04)	1.08E-02 (2.84E-03)
	8	3.77E-04 (1.45E-04)	3.62E-03 (2.98E-03)
	9	3.50E-06 (1.63E-06)	7.77E-04 (2.24E-03)
	10	3.31E+02 (1.36E+01)	3.80E+02 (1.86E+01)
	t/w/l	–	0/0/10
ManyTask10 (large)	1	5.18E+01 (1.72E+01)	4.82E+01 (5.97E-01)
	2	5.45E-03 (1.03E-03)	1.11E-02 (1.80E-03)
	3	1.24E-02 (1.20E-02)	3.70E+01 (1.00E+02)
	4	5.70E-06 (1.62E-06)	7.95E-04 (2.23E-03)
	5	3.90E+02 (1.36E+01)	3.90E+02 (1.12E+01)
	6	4.72E+01 (1.50E+00)	4.75E+01 (1.02E+00)
	7	4.72E-03 (9.65E-04)	1.15E-02 (5.57E-03)
	8	3.91E-02 (3.55E-02)	6.31E+01 (1.04E+02)
	9	8.50E-06 (2.20E-06)	2.88E-05 (1.42E-05)
	10	3.88E+02 (1.01E+01)	3.83E+02 (1.60E+01)
	t/w/l	–	3/1/6

TABLE S8: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2, MFEA, and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in each MTO problem in test suite 1. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon’s rank-sum test, with the result represented by (“t/w/l”), over all 18 component tasks from all nine MTO problems in test suite 1.

Problem	Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	1	0.00E+00 (0.00E+00)	7.92E-06 (5.98E-06)	2.71E-04 (1.13E-04)	1.75E-03 (4.69E-04)	5.25E-03 (5.23E-03)	4.58E-04 (1.79E-04)
	2	2.69E-06 (4.21E-06)	1.20E-02 (8.26E-03)	3.73E-01 (1.48E-01)	2.72E+00 (7.91E-01)	1.75E+01 (2.80E+01)	4.06E+02 (1.52E+01)
2	1	2.31E-07 (4.21E-07)	4.79E-04 (1.63E-04)	9.01E-03 (2.00E-03)	2.95E-02 (4.90E-03)	8.34E-01 (4.39E-01)	1.62E-02 (5.50E-03)
	2	0.00E+00 (0.00E+00)	1.43E-04 (9.20E-05)	4.62E-02 (1.79E-02)	4.58E-01 (1.24E-01)	4.14E+01 (2.61E+01)	4.06E+02 (1.18E+01)
3	1	2.12E+01 (4.49E-02)	2.12E+01 (4.55E-02)	2.12E+01 (2.82E-02)	2.12E+01 (2.98E-02)	1.70E+01 (7.26E+00)	2.12E+01 (3.62E-02)
	2	7.26E+03 (5.75E+02)	9.41E+03 (6.12E+02)	1.21E+04 (4.16E+02)	1.25E+04 (4.18E+02)	8.25E+02 (4.28E+02)	1.10E+04 (1.10E+03)
4	1	4.00E+02 (1.34E+01)	4.19E+02 (1.72E+01)	4.12E+02 (8.62E+00)	4.04E+02 (1.50E+01)	8.44E+01 (2.48E+01)	4.09E+02 (1.27E+01)
	2	1.89E-04 (1.07E-04)	2.24E-02 (6.20E-03)	1.28E-03 (7.62E-04)	6.56E-02 (4.07E-02)	8.59E-03 (3.53E-03)	1.52E-04 (5.68E-05)
5	1	1.79E-01 (6.17E-01)	8.21E-03 (2.80E-03)	1.73E-02 (4.17E-03)	2.88E-02 (6.77E-03)	8.23E-01 (5.53E-01)	1.21E-02 (2.57E-03)
	2	3.59E+02 (9.51E+02)	8.67E+01 (5.33E-01)	5.77E+01 (1.93E+01)	9.08E+01 (1.32E+00)	1.21E+02 (2.84E+01)	6.80E+01 (3.09E+01)
6	1	4.27E-02 (2.03E-02)	5.95E-01 (2.49E-01)	4.40E-02 (1.78E-02)	5.40E-02 (1.74E-02)	6.12E-01 (4.96E-01)	1.38E-02 (3.62E-03)
	2	1.46E-02 (4.41E-03)	6.77E-02 (2.14E-02)	1.38E-02 (5.50E-03)	3.14E-02 (7.99E-03)	2.89E-01 (1.17E-01)	7.29E-03 (1.72E-03)
7	1	4.72E+01 (3.63E+00)	4.71E+01 (5.22E-01)	4.76E+01 (6.45E-01)	5.65E+01 (2.41E+01)	1.24E+02 (3.21E+01)	5.21E+01 (1.49E+01)
	2	1.62E+01 (5.36E+01)	3.52E-01 (5.51E-01)	7.86E-01 (5.32E-01)	3.60E+01 (9.74E+01)	8.10E+01 (1.96E+01)	3.96E+02 (1.35E+01)
8	1	2.64E-03 (3.81E-03)	6.56E-03 (4.59E-03)	1.94E-03 (7.87E-04)	1.60E-03 (7.43E-04)	8.44E-03 (4.88E-03)	4.98E-04 (2.13E-04)
	2	2.07E+00 (1.49E-01)	2.84E+00 (2.41E-01)	2.53E+00 (1.71E-01)	3.32E+00 (1.42E-01)	5.16E+00 (6.71E-01)	3.91E+00 (2.39E+00)
9	1	4.03E+02 (1.90E+01)	4.17E+02 (2.27E+01)	4.07E+02 (1.27E+01)	4.01E+02 (1.61E+01)	9.94E+01 (8.18E+01)	4.09E+02 (1.35E+01)
	2	1.28E+04 (1.02E+03)	1.28E+04 (7.16E+02)	1.18E+04 (1.65E+03)	1.16E+04 (1.35E+03)	7.55E+02 (1.78E+02)	1.10E+04 (1.10E+03)
t/w/l		–	4/3/11	7/2/9	4/3/11	0/6/12	6/4/8

TABLE S9: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in MaTDE-problem. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon’s rank-sum test, with the result represented by (“t/w/l”), over all 10 component tasks in MaTDE-problem.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	0.00E+00 (0.00E+00)	2.45E-03 (1.50E-03)	1.64E-03 (1.18E-03)	1.63E-03 (5.68E-04)	2.98E-03 (1.23E-03)	3.22E-04 (2.26E-04)
2	0.00E+00 (0.00E+00)	8.23E-04 (2.31E-04)	3.56E-04 (2.13E-04)	1.32E-03 (6.48E-04)	7.32E-04 (3.85E-04)	2.38E-04 (1.98E-04)
3	0.00E+00 (0.00E+00)	1.13E-03 (5.21E-04)	5.66E-04 (3.12E-04)	9.30E-04 (5.93E-04)	3.01E-04 (3.51E-04)	2.14E-04 (1.36E-04)
4	1.75E-04 (5.28E-05)	1.57E-02 (4.67E-03)	1.36E-02 (3.65E-03)	1.56E-02 (3.87E-03)	1.74E-02 (1.06E-02)	5.74E-02 (2.14E-01)
5	0.00E+00 (0.00E+00)	3.67E+01 (2.03E+01)	3.40E+01 (2.17E+01)	1.91E-01 (7.57E-02)	2.52E-01 (8.43E-02)	5.60E+01 (2.36E+01)
6	1.00E-07 (3.00E-07)	8.13E-03 (1.24E-03)	4.93E-03 (1.35E-03)	1.04E-02 (2.67E-03)	7.62E-03 (2.05E-03)	2.11E+01 (4.19E-02)
7	5.03E-04 (1.15E-04)	3.13E-01 (5.07E-02)	2.21E-01 (3.82E-02)	2.64E-01 (5.31E-02)	8.96E-02 (4.50E-02)	1.65E+00 (8.42E-01)
8	1.20E-03 (5.32E-04)	1.33E-02 (7.14E-03)	1.05E-02 (7.48E-03)	8.56E-03 (3.73E-03)	8.37E+02 (2.25E+02)	1.17E+04 (1.22E+03)
9	3.28E-05 (2.26E-05)	3.94E-05 (1.69E-05)	3.88E-04 (1.61E-03)	3.35E-05 (2.00E-05)	3.73E-03 (6.79E-03)	6.95E-06 (4.09E-06)
10	3.73E+02 (1.61E+01)	3.83E+02 (1.63E+01)	3.86E+02 (1.67E+01)	3.82E+02 (1.66E+01)	1.49E-01 (9.44E-02)	3.91E+02 (1.07E+01)
t/w/l	–	1/0/9	2/0/8	2/0/8	0/1/9	0/1/9

TABLE S10: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in ManyTask10-zero. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon’s rank-sum test, with the result represented by (“t/w/l”), over all 10 component tasks in ManyTask10-zero.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	0.00E+00 (0.00E+00)	8.54E-01 (4.00E-01)	1.19E+01 (2.02E+01)	2.86E-01 (1.70E-01)	8.93E-03 (6.93E-03)	5.43E+01 (2.97E+01)
2	0.00E+00 (0.00E+00)	2.50E-02 (4.10E-03)	6.31E-03 (9.43E-04)	1.34E-02 (3.42E-03)	2.62E-03 (1.06E-03)	9.67E+00 (9.64E+00)
3	0.00E+00 (0.00E+00)	2.07E-02 (6.28E-03)	1.52E-03 (4.13E-04)	7.61E-03 (3.68E-03)	2.92E-01 (4.44E-02)	9.08E+03 (7.07E+02)
4	0.00E+00 (0.00E+00)	1.92E-04 (5.08E-05)	1.44E-05 (4.69E-06)	5.09E-05 (2.39E-05)	2.20E-06 (1.60E-06)	1.52E-05 (1.61E-05)
5	0.00E+00 (0.00E+00)	3.22E-01 (8.89E-02)	2.47E-02 (6.28E-03)	1.12E-01 (6.07E-02)	4.88E-03 (3.85E-03)	3.87E+02 (1.24E+01)
6	0.00E+00 (0.00E+00)	9.72E-01 (5.96E-01)	9.51E+00 (1.87E+01)	2.74E+00 (1.05E+01)	8.34E-03 (5.91E-03)	6.50E+01 (3.32E+01)
7	0.00E+00 (0.00E+00)	2.56E-02 (5.58E-03)	6.79E-03 (1.72E-03)	1.32E-02 (4.24E-03)	2.53E-03 (9.14E-04)	8.00E+00 (9.71E+00)
8	0.00E+00 (0.00E+00)	2.24E-02 (8.57E-03)	1.85E-03 (8.38E-04)	6.65E-03 (4.39E-03)	9.08E+00 (1.86E+00)	1.02E+04 (4.19E+02)
9	0.00E+00 (0.00E+00)	1.89E-04 (7.97E-05)	1.71E-05 (8.00E-06)	6.16E-05 (6.43E-05)	2.35E-06 (1.80E-06)	1.79E-05 (3.18E-05)
10	0.00E+00 (0.00E+00)	3.54E-01 (1.32E-01)	2.88E-02 (1.27E-02)	2.67E+00 (1.12E+01)	4.95E-03 (3.99E-03)	3.85E+02 (1.76E+01)
t/w/l	–	0/0/10	0/0/10	0/0/10	0/0/10	0/0/10



TABLE S11: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in ManyTask10-small. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 10 component tasks in ManyTask10-small.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	5.47E+01 (2.84E+01)	7.89E+01 (2.43E+01)	4.79E+01 (1.74E+00)	4.94E+01 (3.54E+00)	1.15E+02 (4.39E+01)	5.62E+01 (2.19E+01)
2	1.83E-03 (3.53E-04)	8.28E-02 (1.82E-02)	1.12E-02 (3.50E-03)	2.15E-02 (6.92E-03)	2.20E-02 (3.82E-03)	7.01E+00 (9.30E+00)
3	1.71E-04 (1.00E-04)	1.41E-01 (7.06E-02)	4.40E-03 (2.41E-03)	1.31E-02 (6.18E-03)	2.99E+01 (5.13E+01)	9.20E+03 (4.74E+02)
4	1.30E-06 (6.40E-07)	1.17E-03 (6.50E-04)	3.22E-05 (1.92E-05)	4.74E-04 (1.63E-03)	2.36E-03 (4.51E-03)	1.34E-05 (1.51E-05)
5	2.12E+02 (1.16E+01)	2.77E+02 (1.17E+01)	2.92E+02 (1.45E+01)	3.00E+02 (2.41E+01)	3.90E-01 (4.22E-01)	3.84E+02 (1.91E+01)
6	5.68E+01 (2.64E+01)	6.81E+01 (1.58E+01)	5.25E+01 (1.61E+01)	5.25E+01 (1.19E+01)	1.46E+02 (4.74E+01)	7.00E+01 (4.03E+01)
7	2.17E-03 (4.42E-04)	8.01E-02 (1.21E-02)	9.52E-03 (3.06E-03)	2.21E-02 (6.80E-03)	2.30E-02 (5.63E-03)	4.63E+00 (7.14E+00)
8	1.76E-04 (9.69E-05)	1.24E-01 (5.90E-02)	3.68E-03 (1.48E-03)	1.42E-02 (7.78E-03)	8.52E+00 (2.14E+00)	1.01E+04 (4.26E+02)
9	1.60E-06 (9.17E-07)	1.24E-03 (4.93E-04)	3.64E-05 (3.13E-05)	4.56E-04 (1.60E-03)	9.70E-04 (2.25E-03)	7.60E-06 (5.06E-06)
10	1.91E+02 (1.24E+01)	2.54E+02 (1.12E+01)	2.66E+02 (1.69E+01)	2.56E+02 (3.07E+01)	2.54E-01 (2.82E-01)	3.83E+02 (1.80E+01)
t/w/l	–	0/0/10	2/0/8	1/1/8	0/2/8	1/0/9

TABLE S12: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in ManyTask10-medium. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 10 component tasks in ManyTask10-medium.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	5.20E+01 (1.68E+01)	7.49E+01 (2.08E+01)	5.59E+01 (2.49E+01)	5.22E+01 (1.43E+01)	1.35E+02 (2.91E+01)	4.75E+01 (2.62E+00)
2	5.14E-03 (1.45E-03)	1.17E-01 (3.45E-02)	1.28E-02 (3.40E-03)	2.04E-02 (5.33E-03)	2.60E-02 (9.36E-03)	1.08E+01 (9.46E+00)
3	8.25E-04 (3.87E-04)	3.64E-01 (1.92E-01)	1.71E-02 (1.56E-02)	5.34E-02 (3.70E-02)	1.35E+02 (1.44E+02)	8.74E+03 (6.53E+02)
4	3.78E-04 (1.62E-03)	2.29E-03 (1.22E-03)	4.16E-04 (1.61E-03)	7.02E-05 (3.80E-05)	2.89E-03 (4.08E-03)	7.65E-06 (3.50E-06)
5	3.18E+02 (4.26E+01)	4.12E+02 (1.29E+01)	3.95E+02 (1.39E+01)	3.88E+02 (1.43E+01)	1.64E-01 (7.61E-02)	3.77E+02 (2.09E+01)
6	4.68E+01 (1.60E+00)	7.38E+01 (2.22E+01)	5.30E+01 (1.73E+01)	5.30E+01 (1.27E+01)	4.68E+02 (9.46E+02)	5.08E+01 (1.24E+01)
7	5.61E-03 (1.84E-03)	1.19E-01 (2.64E-02)	1.27E-02 (2.77E-03)	2.14E-02 (6.93E-03)	2.16E-02 (5.75E-03)	9.00E+00 (9.87E+00)
8	9.63E-04 (5.17E-04)	4.13E-01 (2.42E-01)	1.27E-02 (7.54E-03)	3.96E-02 (3.42E-02)	9.42E+00 (1.86E+00)	1.01E+04 (4.00E+02)
9	1.08E-05 (7.93E-06)	2.83E-03 (1.85E-03)	4.09E-04 (1.61E-03)	4.55E-04 (1.62E-03)	3.35E-03 (4.72E-03)	6.20E-06 (2.11E-06)
10	3.23E+02 (1.29E+01)	3.92E+02 (1.92E+01)	3.83E+02 (2.12E+01)	3.84E+02 (1.61E+01)	2.20E-01 (2.44E-01)	3.86E+02 (1.32E+01)
t/w/l	–	0/0/10	0/0/10	0/1/9	0/2/8	3/0/7

TABLE S13: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in ManyTask10-large. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 10 component tasks in ManyTask10-large.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	4.94E+01 (6.61E+00)	1.04E+02 (3.89E+01)	5.43E+01 (1.84E+01)	4.89E+01 (1.44E+00)	1.29E+02 (5.88E+01)	4.75E+01 (1.42E+00)
2	6.93E-03 (2.82E-03)	1.45E-01 (5.88E-02)	1.36E-02 (2.65E-03)	1.92E-02 (5.82E-03)	2.28E-02 (4.48E-03)	1.44E+01 (9.33E+00)
3	7.53E-02 (2.15E-01)	1.62E+02 (2.46E+02)	1.86E+02 (3.11E+02)	1.45E+02 (2.65E+02)	8.98E+01 (1.06E+02)	8.80E+03 (6.98E+02)
4	1.64E-05 (8.73E-06)	2.44E-03 (9.63E-04)	4.05E-05 (2.07E-05)	6.76E-05 (3.91E-05)	2.32E-03 (3.41E-03)	8.75E-06 (5.08E-06)
5	3.87E+02 (1.61E+01)	4.03E+02 (1.73E+01)	3.89E+02 (1.69E+01)	3.84E+02 (1.67E+01)	1.36E-01 (5.40E-02)	3.79E+02 (1.66E+01)
6	5.40E+01 (2.05E+01)	1.04E+02 (4.51E+01)	5.80E+01 (1.94E+01)	5.40E+01 (1.60E+01)	3.04E+02 (4.76E+02)	6.92E+01 (4.25E+01)
7	7.65E-03 (2.25E-03)	1.32E-01 (3.66E-02)	1.28E-02 (3.44E-03)	1.68E-02 (3.97E-03)	2.36E-02 (4.90E-03)	6.63E+00 (9.40E+00)
8	7.29E-01 (1.20E+00)	4.63E+02 (3.93E+02)	4.29E+02 (4.29E+02)	7.29E+02 (7.53E+02)	9.01E+00 (2.05E+00)	1.02E+04 (4.69E+02)
9	1.44E-05 (6.44E-06)	3.00E-03 (1.39E-03)	5.41E-05 (3.30E-05)	7.52E-05 (4.98E-05)	2.60E-03 (3.59E-03)	1.00E-05 (5.97E-06)
10	3.87E+02 (1.63E+01)	3.95E+02 (1.77E+01)	3.85E+02 (1.31E+01)	3.87E+02 (1.90E+01)	1.29E-01 (6.00E-02)	3.85E+02 (1.40E+01)
t/w/l	–	1/0/9	2/0/8	2/1/7	0/2/9	4/2/4

TABLE S14: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in problem 1 in test suite 3. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 50 component tasks in problem 1 in test suite 3.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	6.35E+01 (4.13E+01)	1.06E+02 (4.50E+01)	6.19E+01 (2.33E+01)	5.49E+01 (1.63E+01)	1.51E+02 (3.64E+01)	5.97E+01 (1.59E+01)
2	5.92E+01 (2.54E+01)	9.39E+01 (4.21E+01)	5.19E+01 (1.42E+01)	5.89E+01 (2.23E+01)	1.61E+02 (3.20E+01)	6.82E+01 (3.06E+01)
3	5.22E+01 (1.59E+01)	9.29E+01 (3.58E+01)	5.43E+01 (1.73E+01)	6.35E+01 (3.34E+01)	1.57E+02 (4.68E+01)	7.63E+01 (4.22E+01)
4	5.16E+01 (1.58E+01)	1.22E+02 (4.26E+01)	5.52E+01 (1.89E+01)	6.36E+01 (2.59E+01)	1.38E+02 (3.09E+01)	5.34E+01 (4.91E+00)
5	6.19E+01 (2.80E+01)	9.23E+01 (2.57E+01)	6.08E+01 (2.53E+01)	6.01E+01 (2.61E+01)	3.84E+02 (7.59E+02)	7.38E+01 (3.26E+01)
6	5.81E+01 (2.40E+01)	9.67E+01 (4.12E+01)	6.32E+01 (2.82E+01)	5.61E+01 (1.69E+01)	3.73E+02 (6.91E+02)	6.36E+01 (3.28E+01)
7	4.81E+01 (1.03E+00)	9.82E+01 (2.70E+01)	5.30E+01 (1.51E+01)	5.47E+01 (1.38E+01)	1.49E+02 (5.11E+01)	6.43E+01 (3.50E+01)
8	5.57E+01 (2.27E+01)	1.37E+02 (7.39E+01)	6.23E+01 (3.13E+01)	6.08E+01 (2.23E+01)	1.45E+02 (3.73E+01)	7.31E+01 (3.87E+01)
9	4.88E+01 (2.45E+00)	1.10E+02 (4.12E+01)	5.26E+01 (1.61E+01)	5.98E+01 (2.26E+01)	1.54E+02 (5.14E+01)	5.69E+01 (1.73E+01)
10	5.11E+01 (1.26E+01)	9.64E+01 (3.72E+01)	5.55E+01 (1.99E+01)	5.53E+01 (1.21E+01)	1.80E+02 (1.71E+02)	6.11E+01 (2.35E+01)
11	5.14E+01 (1.50E+01)	8.43E+01 (2.58E+01)	5.96E+01 (2.37E+01)	6.55E+01 (2.87E+01)	1.51E+02 (4.78E+01)	6.75E+01 (3.61E+01)
12	6.05E+01 (2.50E+01)	1.00E+02 (5.08E+01)	5.20E+01 (1.42E+01)	5.45E+01 (4.92E+00)	1.47E+02 (3.31E+01)	5.62E+01 (1.40E+01)
13	4.89E+01 (3.68E+00)	8.49E+01 (3.03E+01)	4.95E+01 (3.45E+00)	6.23E+01 (2.70E+01)	4.80E+02 (1.10E+03)	6.35E+01 (2.18E+01)
14	5.50E+01 (2.03E+01)	1.22E+02 (6.17E+01)	5.85E+01 (2.41E+01)	5.93E+01 (2.40E+01)	5.23E+02 (1.15E+03)	6.11E+01 (2.37E+01)
15	5.17E+01 (1.53E+01)	9.98E+01 (4.34E+01)	5.55E+01 (2.01E+01)	7.33E+01 (3.84E+01)	3.38E+02 (7.43E+02)	6.41E+01 (2.40E+01)
16	6.32E+01 (3.07E+01)	1.17E+02 (7.38E+01)	5.62E+01 (2.07E+01)	5.83E+01 (2.11E+01)	5.15E+02 (1.14E+03)	5.98E+01 (1.85E+01)
17	5.69E+01 (2.02E+01)	1.43E+02 (5.70E+01)	6.55E+01 (2.69E+01)	8.07E+01 (4.40E+01)	3.27E+02 (7.89E+02)	6.36E+01 (2.90E+01)
18	5.21E+01 (1.93E+01)	1.03E+02 (3.08E+01)	5.83E+01 (2.82E+01)	7.03E+01 (3.92E+01)	5.80E+02 (1.02E+03)	5.95E+01 (1.53E+01)
19	5.48E+01 (2.04E+01)	1.16E+02 (5.54E+01)	5.54E+01 (2.06E+01)	6.63E+01 (2.78E+01)	2.92E+02 (5.34E+02)	5.68E+01 (1.64E+01)
20	5.07E+01 (1.19E+01)	9.32E+01 (3.65E+01)	6.58E+01 (4.25E+01)	5.91E+01 (1.74E+01)	4.95E+02 (9.30E+02)	5.21E+01 (3.66E+00)
21	5.24E+01 (1.57E+01)	1.04E+02 (3.19E+01)	5.19E+01 (1.63E+01)	7.29E+01 (5.24E+01)	3.43E+02 (7.25E+02)	7.95E+01 (4.36E+01)
22	7.53E+01 (3.74E+01)	1.30E+02 (5.83E+01)	7.38E+01 (4.22E+01)	8.37E+01 (5.85E+01)	8.15E+02 (1.40E+03)	7.41E+01 (3.44E+01)
23	5.40E+01 (1.80E+01)	1.00E+02 (3.03E+01)	5.91E+01 (2.35E+01)	5.84E+01 (1.90E+01)	3.31E+02 (5.70E+02)	5.94E+01 (2.26E+01)
24	5.11E+01 (1.30E+01)	9.40E+01 (4.05E+01)	5.48E+01 (1.75E+01)	6.32E+01 (2.53E+01)	2.92E+02 (5.05E+02)	6.34E+01 (3.44E+01)
25	4.94E+01 (3.87E+00)	8.08E+01 (1.97E+01)	6.72E+01 (4.20E+01)	6.74E+01 (2.96E+01)	6.44E+02 (1.31E+03)	7.31E+01 (3.61E+01)
26	4.83E+01 (9.75E-01)	9.86E+01 (4.41E+01)	5.55E+01 (2.02E+01)	5.59E+01 (1.78E+01)	2.67E+02 (5.69E+02)	6.02E+01 (1.96E+01)
27	4.82E+01 (1.20E+00)	8.43E+01 (2.28E+01)	5.20E+01 (1.38E+01)	5.11E+01 (2.57E+00)	4.07E+02 (8.75E+02)	6.06E+01 (2.39E+01)
28	5.26E+01 (1.40E+01)	1.02E+02 (3.98E+01)	5.98E+01 (2.27E+01)	5.29E+01 (4.36E+00)	2.95E+02 (4.64E+02)	6.19E+01 (2.76E+01)
29	6.87E+01 (3.63E+01)	1.15E+02 (4.67E+01)	5.46E+01 (1.90E+01)	6.17E+01 (2.70E+01)	1.52E+02 (5.09E+01)	7.85E+01 (5.76E+01)
30	6.19E+01 (2.79E+01)	1.07E+02 (5.14E+01)	5.93E+01 (2.43E+01)	6.03E+01 (2.27E+01)	3.78E+02 (9.20E+02)	7.20E+01 (4.20E+01)
31	4.83E+01 (9.90E-01)	9.36E+01 (2.77E+01)	5.56E+01 (2.14E+01)	7.25E+01 (3.82E+01)	1.47E+02 (4.00E+01)	5.34E+01 (6.71E+00)
32	6.37E+01 (2.83E+01)	1.19E+02 (6.65E+01)	6.65E+01 (4.21E+01)	5.86E+01 (2.37E+01)	1.44E+02 (4.30E+01)	5.56E+01 (6.82E+00)
33	4.88E+01 (2.43E+00)	1.06E+02 (6.21E+01)	5.00E+01 (6.48E+00)	6.21E+01 (2.76E+01)	2.89E+02 (5.66E+02)	7.44E+01 (3.44E+01)
34	4.84E+01 (1.29E+00)	1.18E+02 (5.26E+01)	5.14E+01 (8.55E+00)	5.69E+01 (1.22E+01)	5.12E+02 (8.97E+02)	6.25E+01 (2.80E+01)
35	7.12E+01 (3.19E+01)	9.85E+01 (4.24E+01)	6.41E+01 (2.68E+01)	5.16E+01 (3.23E+00)	1.44E+02 (3.24E+01)	6.50E+01 (2.93E+01)
36	6.04E+01 (2.72E+01)	1.50E+02 (7.65E+01)	5.88E+01 (2.43E+01)	6.63E+01 (2.85E+01)	1.40E+02 (4.17E+01)	5.88E+01 (2.30E+01)
37	5.19E+01 (1.41E+01)	1.13E+02 (5.28E+01)	5.78E+01 (2.37E+01)	6.00E+01 (2.18E+01)	2.49E+02 (4.23E+02)	6.91E+01 (3.20E+01)
38	7.66E+01 (3.32E+01)	1.32E+02 (6.83E+01)	5.91E+01 (2.35E+01)	5.66E+01 (1.39E+01)	4.33E+02 (8.81E+02)	6.87E+01 (3.25E+01)
39	5.24E+01 (1.72E+01)	1.27E+02 (5.40E+01)	5.37E+01 (2.02E+01)	5.86E+01 (2.33E+01)	2.69E+02 (4.00E+02)	6.14E+01 (2.23E+01)
40	4.94E+01 (2.30E+00)	1.01E+02 (4.19E+01)	6.22E+01 (2.74E+01)	6.69E+01 (3.29E+01)	4.75E+02 (7.77E+02)	5.82E+01 (1.93E+01)
41	7.83E+01 (3.39E+01)	1.10E+02 (5.77E+01)	5.20E+01 (1.33E+01)	8.04E+01 (3.79E+01)	2.13E+02 (1.94E+02)	6.23E+01 (3.10E+01)
42	4.81E+01 (2.38E+00)	8.44E+01 (3.20E+01)	4.99E+01 (4.96E+00)	5.58E+01 (1.69E+01)	2.30E+02 (4.11E+02)	5.51E+01 (6.29E+00)
43	5.07E+01 (1.18E+01)	9.70E+01 (3.13E+01)	4.90E+01 (1.77E+00)	5.31E+01 (3.16E+00)	1.32E+02 (3.89E+01)	7.27E+01 (3.66E+01)
44	5.48E+01 (1.76E+01)	1.02E+02 (3.33E+01)	6.16E+01 (3.87E+01)	6.46E+01 (2.52E+01)	5.61E+02 (9.60E+02)	5.68E+01 (2.07E+01)
45	5.14E+01 (1.66E+01)	9.64E+01 (3.57E+01)	5.39E+01 (1.55E+01)	6.52E+01 (2.62E+01)	1.49E+02 (4.27E+01)	5.99E+01 (1.86E+01)
46	6.20E+01 (2.76E+01)	1.29E+02 (5.52E+01)	6.21E+01 (3.49E+01)	6.24E+01 (3.18E+01)	4.97E+02 (1.09E+03)	5.95E+01 (2.40E+01)
47	6.44E+01 (4.29E+01)	1.37E+02 (7.19E+01)	6.34E+01 (3.35E+01)	6.39E+01 (3.03E+01)	3.04E+02 (6.08E+02)	7.65E+01 (4.59E+01)
48	5.30E+01 (2.15E+01)	1.33E+02 (7.94E+01)	5.70E+01 (2.47E+01)	5.65E+01 (1.24E+01)	7.80E+02 (1.40E+03)	7.61E+01 (3.63E+01)
49	5.15E+01 (1.48E+01)	1.05E+02 (3.61E+01)	5.17E+01 (1.25E+01)	5.80E+01 (1.86E+01)	1.51E+02 (4.05E+01)	6.95E+01 (2.73E+01)
50	6.30E+01 (2.74E+01)	1.40E+02 (7.31E+01)	4.93E+01 (2.06E+00)	5.94E+01 (2.31E+01)	3.14E+02 (5.19E+02)	5.31E+01 (4.54E+00)
t/w/l	-	1/0/49	3/7/12	5/10/35	0/0/50	6/5/39

TABLE S15: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in problem 2 in test suite 3. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 50 component tasks in problem 2 in test suite 3.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	1.02E-02 (3.11E-02)	1.06E-02 (1.99E-03)	1.33E-02 (3.09E-03)	4.51E-02 (1.19E-02)	2.67E-02 (2.90E-03)	5.38E-02 (2.40E-02)
2	1.31E-02 (3.31E-02)	1.06E-02 (2.96E-03)	1.29E-02 (2.25E-03)	5.92E-02 (1.89E-02)	2.53E-02 (3.73E-03)	6.36E-02 (3.89E-02)
3	1.28E-02 (2.92E-02)	9.86E-03 (2.04E-03)	1.31E-02 (2.52E-03)	5.60E-02 (1.68E-02)	2.40E-02 (2.86E-03)	6.05E-02 (3.02E-02)
4	1.14E-02 (2.63E-02)	1.13E-02 (2.22E-03)	1.34E-02 (2.36E-03)	6.40E-02 (1.87E-02)	2.53E-02 (3.62E-03)	5.47E-02 (2.70E-02)
5	1.17E-02 (3.10E-02)	1.05E-02 (1.45E-03)	1.39E-02 (2.73E-03)	5.47E-02 (1.84E-02)	2.47E-02 (3.19E-03)	6.97E-02 (3.53E-02)
6	8.24E-03 (2.63E-02)	1.02E-02 (2.40E-03)	1.30E-02 (3.08E-03)	6.27E-02 (1.65E-02)	2.28E-02 (3.17E-03)	5.78E-02 (2.67E-02)
7	4.39E-03 (8.72E-03)	1.03E-02 (1.60E-03)	1.20E-02 (2.20E-03)	6.26E-02 (1.91E-02)	2.54E-02 (3.54E-03)	5.23E-02 (2.83E-02)
8	1.64E-02 (2.95E-02)	1.06E-02 (2.26E-03)	1.36E-02 (2.85E-03)	6.17E-02 (1.72E-02)	2.60E-02 (3.41E-03)	4.99E-02 (2.68E-02)
9	9.44E-03 (2.28E-02)	1.10E-02 (2.83E-03)	1.40E-02 (2.05E-03)	6.03E-02 (1.40E-02)	2.69E-02 (3.67E-03)	6.17E-02 (3.25E-02)
10	9.27E-03 (2.39E-02)	1.13E-02 (2.90E-03)	1.50E-02 (3.09E-03)	6.64E-02 (1.97E-02)	2.42E-02 (3.62E-03)	5.41E-02 (2.56E-02)
11	9.28E-03 (2.47E-02)	1.07E-02 (1.77E-03)	1.33E-02 (1.93E-03)	5.82E-02 (1.63E-02)	2.50E-02 (3.20E-03)	6.98E-02 (4.49E-02)
12	6.60E-03 (1.88E-02)	1.10E-02 (1.66E-03)	1.22E-02 (2.12E-03)	6.31E-02 (1.75E-02)	2.61E-02 (4.40E-03)	6.43E-02 (2.79E-02)
13	3.64E-03 (1.00E-02)	1.00E-02 (1.84E-03)	1.37E-02 (2.17E-03)	6.09E-02 (1.81E-02)	2.39E-02 (3.08E-03)	6.49E-02 (3.59E-02)
14	1.68E-02 (3.73E-02)	1.01E-02 (1.81E-03)	1.36E-02 (2.30E-03)	6.14E-02 (1.27E-02)	2.62E-02 (4.05E-03)	6.71E-02 (3.80E-02)
15	4.30E-03 (1.03E-02)	1.05E-02 (1.98E-03)	1.23E-02 (2.51E-03)	6.25E-02 (1.99E-02)	2.68E-02 (3.24E-03)	5.11E-02 (2.74E-02)
16	1.06E-02 (2.42E-02)	1.08E-02 (2.31E-03)	1.29E-02 (2.47E-03)	6.07E-02 (1.27E-02)	2.62E-02 (3.90E-03)	6.68E-02 (3.25E-02)
17	1.13E-02 (2.26E-02)	1.09E-02 (1.84E-03)	1.29E-02 (2.70E-03)	6.08E-02 (2.15E-02)	2.56E-02 (2.68E-03)	6.15E-02 (2.96E-02)
18	5.20E-03 (1.21E-02)	1.07E-02 (2.25E-03)	1.35E-02 (3.01E-03)	6.12E-02 (1.87E-02)	2.61E-02 (3.54E-03)	5.43E-02 (2.48E-02)
19	6.52E-03 (1.82E-02)	9.53E-03 (1.96E-03)	1.39E-02 (3.45E-03)	6.18E-02 (1.51E-02)	2.26E-02 (2.11E-03)	5.90E-02 (3.60E-02)
20	1.33E-02 (3.58E-02)	1.08E-02 (2.97E-03)	1.29E-02 (2.21E-03)	6.35E-02 (1.53E-02)	2.62E-02 (4.46E-03)	5.27E-02 (2.72E-02)
21	1.61E-02 (3.29E-02)	1.18E-02 (2.39E-03)	1.29E-02 (2.79E-03)	6.47E-02 (1.96E-02)	2.72E-02 (4.27E-03)	5.88E-02 (3.34E-02)
22	1.35E-02 (2.87E-02)	1.03E-02 (1.94E-03)	1.43E-02 (2.97E-03)	6.27E-02 (1.80E-02)	2.43E-02 (4.04E-03)	5.62E-02 (3.03E-02)
23	1.27E-02 (2.89E-02)	1.09E-02 (2.50E-03)	1.34E-02 (3.00E-03)	6.21E-02 (1.59E-02)	2.57E-02 (3.01E-03)	6.01E-02 (3.36E-02)
24	8.27E-03 (2.10E-02)	1.03E-02 (2.07E-03)	1.37E-02 (3.47E-03)	5.81E-02 (1.67E-02)	2.53E-02 (3.55E-03)	6.05E-02 (3.52E-02)
25	8.38E-03 (3.14E-02)	1.05E-02 (2.11E-03)	1.36E-02 (2.32E-03)	6.24E-02 (2.07E-02)	2.86E-02 (4.96E-03)	5.66E-02 (3.31E-02)
26	8.90E-03 (2.14E-02)	1.05E-02 (2.09E-03)	1.24E-02 (2.73E-03)	6.41E-02 (1.75E-02)	2.53E-02 (3.51E-03)	5.95E-02 (3.12E-02)
27	1.56E-02 (3.48E-02)	1.22E-02 (2.35E-03)	1.41E-02 (2.42E-03)	6.70E-02 (2.02E-02)	2.60E-02 (3.80E-03)	5.21E-02 (2.76E-02)
28	7.15E-03 (1.63E-02)	1.15E-02 (2.27E-03)	1.32E-02 (2.69E-03)	6.40E-02 (1.87E-02)	2.68E-02 (5.34E-03)	6.97E-02 (4.77E-02)
29	6.17E-03 (1.63E-02)	1.01E-02 (1.79E-03)	1.22E-02 (1.95E-03)	6.65E-02 (1.88E-02)	2.64E-02 (3.29E-03)	5.54E-02 (2.88E-02)
30	1.70E-02 (3.44E-02)	1.04E-02 (2.05E-03)	1.27E-02 (3.03E-03)	6.38E-02 (1.71E-02)	2.48E-02 (3.79E-03)	6.11E-02 (3.87E-02)
31	6.21E-03 (1.51E-02)	1.05E-02 (2.03E-03)	1.28E-02 (2.67E-03)	6.33E-02 (1.59E-02)	2.47E-02 (2.49E-03)	6.81E-02 (3.89E-02)
32	1.12E-02 (2.78E-02)	9.86E-03 (2.90E-03)	1.23E-02 (1.68E-03)	6.46E-02 (1.75E-02)	2.67E-02 (5.34E-03)	5.87E-02 (3.86E-02)
33	6.99E-03 (1.71E-02)	1.09E-02 (2.66E-03)	1.34E-02 (3.38E-03)	6.04E-02 (1.34E-02)	2.46E-02 (3.79E-03)	5.69E-02 (2.51E-02)
34	6.41E-03 (1.59E-02)	1.00E-02 (2.48E-03)	1.30E-02 (2.71E-03)	6.38E-02 (1.83E-02)	2.43E-02 (2.78E-03)	5.71E-02 (2.94E-02)
35	1.26E-02 (2.52E-02)	1.12E-02 (2.00E-03)	1.44E-02 (2.68E-03)	6.52E-02 (1.60E-02)	2.82E-02 (4.27E-03)	5.53E-02 (2.95E-02)
36	7.84E-03 (2.07E-02)	1.12E-02 (2.48E-03)	1.34E-02 (2.37E-03)	5.83E-02 (1.76E-02)	2.86E-02 (4.69E-03)	5.80E-02 (3.90E-02)
37	1.18E-02 (3.01E-02)	1.09E-02 (1.66E-03)	1.35E-02 (2.11E-03)	6.41E-02 (1.76E-02)	2.74E-02 (3.84E-03)	5.72E-02 (3.02E-02)
38	1.19E-02 (2.71E-02)	1.03E-02 (1.94E-03)	1.34E-02 (2.44E-03)	6.02E-02 (1.64E-02)	2.62E-02 (3.98E-03)	5.26E-02 (1.81E-02)
39	6.71E-03 (2.15E-02)	9.91E-03 (1.84E-03)	1.33E-02 (2.36E-03)	6.52E-02 (1.73E-02)	2.57E-02 (2.71E-03)	5.38E-02 (2.19E-02)
40	8.17E-03 (2.39E-02)	1.08E-02 (1.73E-03)	1.37E-02 (2.93E-03)	6.03E-02 (1.58E-02)	2.62E-02 (3.87E-03)	5.26E-02 (2.75E-02)
41	9.81E-03 (3.49E-02)	1.06E-02 (1.84E-03)	1.26E-02 (2.73E-03)	6.29E-02 (1.86E-02)	2.66E-02 (4.25E-03)	5.10E-02 (2.64E-02)
42	8.58E-03 (2.63E-02)	9.75E-03 (1.94E-03)	1.36E-02 (2.59E-03)	6.17E-02 (1.47E-02)	2.53E-02 (2.93E-03)	7.47E-02 (5.09E-02)
43	1.23E-02 (2.82E-02)	9.93E-03 (1.73E-03)	1.35E-02 (2.17E-03)	6.54E-02 (2.29E-02)	2.58E-02 (3.95E-03)	6.23E-02 (2.98E-02)
44	1.11E-02 (2.57E-02)	1.12E-02 (2.26E-03)	1.49E-02 (3.40E-03)	5.86E-02 (1.61E-02)	2.66E-02 (4.34E-03)	6.39E-02 (2.92E-02)
45	8.66E-03 (2.84E-02)	9.99E-03 (2.64E-03)	1.30E-02 (2.58E-03)	6.12E-02 (1.36E-02)	2.60E-02 (4.03E-03)	6.58E-02 (3.45E-02)
46	1.10E-02 (2.71E-02)	1.07E-02 (2.17E-03)	1.42E-02 (3.45E-03)	6.80E-02 (1.82E-02)	2.55E-02 (4.18E-03)	6.00E-02 (2.72E-02)
47	8.83E-03 (2.10E-02)	1.13E-02 (2.43E-03)	1.47E-02 (3.02E-03)	6.24E-02 (1.82E-02)	2.67E-02 (3.35E-03)	6.16E-02 (3.51E-02)
48	5.28E-03 (1.35E-02)	1.01E-02 (1.24E-03)	1.29E-02 (3.54E-03)	6.52E-02 (1.63E-02)	2.60E-02 (3.88E-03)	6.05E-02 (3.69E-02)
49	1.14E-02 (2.01E-02)	1.09E-02 (3.12E-03)	1.32E-02 (2.79E-03)	6.39E-02 (1.70E-02)	2.41E-02 (3.13E-03)	5.29E-02 (2.16E-02)
50	8.69E-03 (2.03E-02)	1.02E-02 (1.58E-03)	1.35E-02 (3.08E-03)	6.28E-02 (1.55E-02)	2.76E-02 (2.86E-03)	5.31E-02 (2.50E-02)
t/w/l	–	0/20/30	0/7/43	0/0/50	0/0/50	0/0/50

TABLE S16: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in problem 3 in test suite 3. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 50 component tasks in problem 3 in test suite 3.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	3.99E+02 (1.51E+01)	4.13E+02 (1.20E+01)	4.06E+02 (1.77E+01)	3.97E+02 (1.59E+01)	9.22E+01 (6.69E+01)	4.10E+02 (1.05E+01)
2	3.99E+02 (1.50E+01)	4.16E+02 (1.82E+01)	4.02E+02 (1.62E+01)	4.06E+02 (2.17E+01)	9.06E+01 (2.44E+01)	4.08E+02 (1.63E+01)
3	4.02E+02 (1.94E+01)	4.16E+02 (1.62E+01)	4.02E+02 (1.39E+01)	4.06E+02 (1.67E+01)	1.02E+02 (6.80E+01)	4.08E+02 (1.25E+01)
4	3.98E+02 (1.94E+01)	4.20E+02 (1.71E+01)	4.06E+02 (1.73E+01)	4.01E+02 (1.87E+01)	9.27E+01 (6.48E+01)	4.04E+02 (1.19E+01)
5	3.99E+02 (1.61E+01)	4.13E+02 (1.21E+01)	4.05E+02 (1.55E+01)	4.09E+02 (1.50E+01)	9.44E+01 (6.14E+01)	4.03E+02 (1.54E+01)
6	4.01E+02 (1.62E+01)	4.15E+02 (1.82E+01)	4.09E+02 (2.04E+01)	4.03E+02 (1.57E+01)	8.51E+01 (2.45E+01)	4.06E+02 (1.68E+01)
7	4.08E+02 (1.15E+01)	4.19E+02 (2.03E+01)	3.97E+02 (1.69E+01)	4.09E+02 (1.60E+01)	9.23E+01 (2.73E+01)	4.00E+02 (2.16E+01)
8	4.05E+02 (1.78E+01)	4.14E+02 (1.71E+01)	4.05E+02 (1.77E+01)	3.98E+02 (2.09E+01)	9.88E+01 (6.55E+01)	4.06E+02 (1.40E+01)
9	3.96E+02 (1.61E+01)	4.14E+02 (1.39E+01)	4.06E+02 (8.72E+00)	4.00E+02 (2.11E+01)	1.02E+02 (6.74E+01)	4.01E+02 (1.93E+01)
10	4.04E+02 (1.56E+01)	4.21E+02 (1.25E+01)	4.04E+02 (2.12E+01)	3.99E+02 (1.46E+01)	1.18E+02 (8.31E+01)	3.96E+02 (1.31E+01)
11	4.04E+02 (1.53E+01)	4.10E+02 (2.30E+01)	4.06E+02 (2.10E+01)	4.03E+02 (1.86E+01)	9.40E+01 (5.85E+01)	4.05E+02 (1.74E+01)
12	4.09E+02 (1.06E+01)	4.13E+02 (1.89E+01)	4.10E+02 (1.42E+01)	4.15E+02 (1.34E+01)	9.02E+01 (1.13E+01)	4.04E+02 (1.65E+01)
13	4.02E+02 (1.93E+01)	4.16E+02 (1.79E+01)	4.06E+02 (1.86E+01)	4.09E+02 (1.72E+01)	7.10E+01 (1.34E+01)	4.05E+02 (1.13E+01)
14	3.97E+02 (1.64E+01)	4.19E+02 (1.57E+01)	4.03E+02 (1.82E+01)	4.05E+02 (1.48E+01)	8.91E+01 (2.27E+01)	4.13E+02 (1.73E+01)
15	4.07E+02 (1.22E+01)	4.14E+02 (1.76E+01)	4.05E+02 (1.46E+01)	4.07E+02 (1.59E+01)	9.49E+01 (6.45E+01)	4.09E+02 (2.23E+01)
16	4.03E+02 (1.80E+01)	4.13E+02 (1.48E+01)	4.02E+02 (1.35E+01)	4.06E+02 (1.50E+01)	8.67E+01 (2.82E+01)	4.06E+02 (1.50E+01)
17	4.09E+02 (1.09E+01)	4.18E+02 (1.65E+01)	4.03E+02 (1.64E+01)	3.99E+02 (1.59E+01)	8.58E+01 (6.46E+01)	4.09E+02 (1.51E+01)
18	4.03E+02 (2.03E+01)	4.17E+02 (1.80E+01)	4.07E+02 (1.21E+01)	4.08E+02 (2.05E+01)	8.83E+01 (2.32E+01)	3.96E+02 (1.29E+01)
19	4.06E+02 (1.18E+01)	4.14E+02 (1.72E+01)	4.02E+02 (2.30E+01)	4.00E+02 (1.60E+01)	1.06E+02 (8.57E+01)	4.05E+02 (1.18E+01)
20	4.05E+02 (2.19E+01)	4.17E+02 (1.64E+01)	4.04E+02 (1.65E+01)	4.01E+02 (1.65E+01)	8.35E+01 (1.50E+01)	4.02E+02 (1.29E+01)
21	4.02E+02 (1.53E+01)	4.19E+02 (1.81E+01)	4.06E+02 (1.48E+01)	4.04E+02 (1.13E+01)	8.42E+01 (1.91E+01)	4.02E+02 (1.55E+01)
22	4.07E+02 (1.63E+01)	4.21E+02 (1.73E+01)	4.05E+02 (2.30E+01)	4.12E+02 (1.69E+01)	9.66E+01 (3.03E+01)	4.01E+02 (1.71E+01)
23	4.07E+02 (1.72E+01)	4.15E+02 (1.24E+01)	4.08E+02 (1.46E+01)	4.01E+02 (1.62E+01)	8.06E+01 (1.54E+01)	3.99E+02 (1.38E+01)
24	4.06E+02 (1.48E+01)	4.14E+02 (1.83E+01)	3.99E+02 (1.86E+01)	4.08E+02 (7.64E+00)	8.26E+01 (1.98E+01)	4.03E+02 (1.23E+01)
25	3.99E+02 (1.87E+01)	4.22E+02 (1.77E+01)	4.00E+02 (1.47E+01)	4.11E+02 (1.31E+01)	8.19E+01 (2.38E+01)	4.04E+02 (1.73E+01)
26	4.03E+02 (1.65E+01)	4.17E+02 (1.79E+01)	4.01E+02 (2.00E+01)	4.02E+02 (2.27E+01)	9.83E+01 (7.25E+01)	4.12E+02 (1.67E+01)
27	3.99E+02 (1.77E+01)	4.16E+02 (1.71E+01)	4.03E+02 (1.77E+01)	4.04E+02 (1.79E+01)	8.54E+01 (2.52E+01)	4.01E+02 (2.08E+01)
28	4.00E+02 (1.36E+01)	4.13E+02 (1.34E+01)	3.99E+02 (2.36E+01)	4.00E+02 (1.99E+01)	8.71E+01 (1.71E+01)	4.05E+02 (1.41E+01)
29	4.02E+02 (1.72E+01)	4.19E+02 (1.50E+01)	4.06E+02 (1.47E+01)	4.00E+02 (1.75E+01)	8.55E+01 (2.20E+01)	4.07E+02 (1.28E+01)
30	4.04E+02 (1.61E+01)	4.12E+02 (1.13E+01)	4.08E+02 (1.25E+01)	4.08E+02 (1.99E+01)	9.92E+01 (4.78E+01)	4.07E+02 (1.07E+01)
31	4.01E+02 (1.38E+01)	4.20E+02 (1.31E+01)	3.99E+02 (1.87E+01)	4.01E+02 (1.85E+01)	1.02E+02 (6.53E+01)	4.05E+02 (2.01E+01)
32	4.08E+02 (1.33E+01)	4.19E+02 (1.45E+01)	4.09E+02 (1.54E+01)	4.04E+02 (2.02E+01)	9.00E+01 (2.52E+01)	4.09E+02 (1.39E+01)
33	4.02E+02 (1.55E+01)	4.19E+02 (1.41E+01)	3.99E+02 (2.09E+01)	4.08E+02 (1.56E+01)	9.46E+01 (3.45E+01)	4.02E+02 (1.64E+01)
34	3.99E+02 (1.95E+01)	4.21E+02 (1.44E+01)	4.11E+02 (1.48E+01)	3.97E+02 (1.72E+01)	1.02E+02 (7.28E+01)	4.07E+02 (1.27E+01)
35	3.97E+02 (2.00E+01)	4.18E+02 (1.80E+01)	4.05E+02 (1.50E+01)	4.01E+02 (2.43E+01)	1.17E+02 (7.28E+01)	4.03E+02 (1.93E+01)
36	4.05E+02 (1.80E+01)	4.20E+02 (1.55E+01)	4.06E+02 (1.97E+01)	4.05E+02 (1.58E+01)	8.76E+01 (1.45E+01)	4.16E+02 (1.38E+01)
37	4.05E+02 (1.80E+01)	4.18E+02 (1.30E+01)	4.03E+02 (1.71E+01)	4.06E+02 (1.92E+01)	8.40E+01 (2.53E+01)	4.04E+02 (1.49E+01)
38	4.04E+02 (1.80E+01)	4.11E+02 (1.90E+01)	4.05E+02 (1.76E+01)	4.09E+02 (1.48E+01)	8.23E+01 (2.00E+01)	4.04E+02 (1.48E+01)
39	4.02E+02 (1.79E+01)	4.22E+02 (2.18E+01)	4.03E+02 (1.60E+01)	4.07E+02 (1.18E+01)	8.67E+01 (2.98E+01)	4.08E+02 (1.10E+01)
40	4.03E+02 (1.71E+01)	4.17E+02 (1.88E+01)	4.04E+02 (2.20E+01)	4.04E+02 (1.59E+01)	8.17E+01 (2.17E+01)	4.04E+02 (1.45E+01)
41	4.03E+02 (1.93E+01)	4.18E+02 (2.06E+01)	4.07E+02 (1.72E+01)	4.08E+02 (1.79E+01)	9.02E+01 (5.62E+01)	4.02E+02 (2.03E+01)
42	4.01E+02 (1.42E+01)	4.15E+02 (2.09E+01)	4.04E+02 (1.26E+01)	4.06E+02 (1.36E+01)	7.94E+01 (1.72E+01)	4.06E+02 (1.52E+01)
43	4.00E+02 (1.50E+01)	4.14E+02 (1.71E+01)	4.05E+02 (2.19E+01)	4.04E+02 (1.39E+01)	8.92E+01 (2.02E+01)	4.08E+02 (1.51E+01)
44	4.05E+02 (1.52E+01)	4.09E+02 (1.53E+01)	4.01E+02 (1.58E+01)	4.04E+02 (1.36E+01)	8.13E+01 (1.80E+01)	4.06E+02 (1.86E+01)
45	3.99E+02 (1.64E+01)	4.20E+02 (1.66E+01)	4.04E+02 (1.76E+01)	3.96E+02 (1.46E+01)	7.92E+01 (1.46E+01)	4.12E+02 (1.82E+01)
46	4.00E+02 (1.67E+01)	4.14E+02 (1.38E+01)	4.03E+02 (2.06E+01)	4.00E+02 (1.50E+01)	8.21E+01 (1.57E+01)	4.09E+02 (1.27E+01)
47	4.01E+02 (1.76E+01)	4.09E+02 (2.78E+01)	4.07E+02 (1.48E+01)	4.06E+02 (2.14E+01)	9.39E+01 (5.69E+01)	4.08E+02 (1.77E+01)
48	4.11E+02 (1.40E+01)	4.23E+02 (1.79E+01)	4.03E+02 (1.49E+01)	4.09E+02 (2.00E+01)	7.54E+01 (1.12E+01)	4.00E+02 (1.30E+01)
49	4.01E+02 (1.57E+01)	4.14E+02 (1.97E+01)	4.00E+02 (2.05E+01)	4.09E+02 (1.76E+01)	8.32E+01 (2.09E+01)	4.04E+02 (1.91E+01)
50	4.07E+02 (1.47E+01)	4.18E+02 (2.10E+01)	4.06E+02 (1.53E+01)	4.05E+02 (1.27E+01)	8.03E+01 (1.15E+01)	3.97E+02 (1.87E+01)
t/w/l	-	14/0/36	48/1/1	48/1/1	0/50/0	45/1/4

TABLE S17: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in problem 4 in test suite 3. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 50 component tasks in problem 4 in test suite 3.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	1.25E-03 (5.65E-04)	2.55E-02 (7.94E-03)	1.32E-03 (6.49E-04)	2.85E-03 (1.45E-03)	8.11E-03 (3.12E-03)	4.89E-03 (4.21E-03)
2	1.38E-03 (8.33E-04)	2.07E-02 (1.08E-02)	1.30E-03 (5.11E-04)	2.50E-03 (9.81E-04)	9.68E-03 (5.09E-03)	3.73E-03 (2.21E-03)
3	1.26E-03 (4.99E-04)	2.44E-02 (7.99E-03)	1.31E-03 (5.61E-04)	2.70E-03 (1.15E-03)	8.20E-03 (3.49E-03)	4.26E-03 (2.66E-03)
4	1.38E-03 (6.33E-04)	2.48E-02 (6.91E-03)	1.51E-03 (8.98E-04)	3.23E-03 (1.53E-03)	7.30E-03 (2.93E-03)	3.81E-03 (2.42E-03)
5	1.24E-03 (5.12E-04)	2.33E-02 (6.78E-03)	1.71E-03 (8.11E-04)	2.70E-03 (1.20E-03)	7.51E-03 (3.58E-03)	4.41E-03 (2.46E-03)
6	1.27E-03 (7.12E-04)	2.43E-02 (7.15E-03)	1.63E-03 (8.52E-04)	2.46E-03 (8.37E-04)	7.11E-03 (2.81E-03)	4.11E-03 (1.77E-03)
7	1.58E-03 (6.63E-04)	2.39E-02 (9.22E-03)	2.10E-03 (1.63E-03)	2.96E-03 (1.28E-03)	7.25E-03 (3.61E-03)	3.78E-03 (1.85E-03)
8	1.27E-03 (4.06E-04)	2.11E-02 (5.90E-03)	1.48E-03 (7.28E-04)	2.66E-03 (9.05E-04)	6.39E-03 (1.96E-03)	4.76E-03 (2.67E-03)
9	1.27E-03 (4.27E-04)	2.15E-02 (6.93E-03)	1.48E-03 (4.48E-04)	2.90E-03 (1.07E-03)	8.02E-03 (3.96E-03)	4.13E-03 (2.79E-03)
10	1.26E-03 (4.22E-04)	2.39E-02 (7.15E-03)	1.60E-03 (6.46E-04)	2.49E-03 (1.08E-03)	7.79E-03 (3.48E-03)	4.03E-03 (2.26E-03)
11	1.54E-03 (6.69E-04)	2.04E-02 (6.23E-03)	1.59E-03 (8.41E-04)	3.67E-03 (2.87E-03)	7.88E-03 (3.42E-03)	3.21E-03 (1.86E-03)
12	1.47E-03 (1.01E-03)	2.57E-02 (1.02E-02)	1.84E-03 (8.91E-04)	2.51E-03 (1.07E-03)	7.67E-03 (3.01E-03)	3.72E-03 (2.54E-03)
13	1.12E-03 (2.75E-04)	2.18E-02 (6.73E-03)	1.97E-03 (2.68E-03)	2.84E-03 (1.05E-03)	9.08E-03 (4.80E-03)	4.53E-03 (3.49E-03)
14	1.43E-03 (5.50E-04)	2.91E-02 (1.01E-02)	1.49E-03 (7.30E-04)	2.93E-03 (1.53E-03)	7.01E-03 (2.04E-03)	3.84E-03 (1.77E-03)
15	1.32E-03 (4.77E-04)	2.25E-02 (7.06E-03)	1.50E-03 (5.04E-04)	2.48E-03 (8.98E-04)	7.50E-03 (2.46E-03)	5.04E-03 (6.01E-03)
16	1.33E-03 (5.48E-04)	2.32E-02 (6.35E-03)	1.54E-03 (7.21E-04)	3.43E-03 (2.02E-03)	8.77E-03 (4.60E-03)	4.42E-03 (3.22E-03)
17	1.42E-03 (5.68E-04)	2.21E-02 (7.15E-03)	1.68E-03 (5.97E-04)	3.14E-03 (2.15E-03)	7.33E-03 (3.74E-03)	4.30E-03 (2.29E-03)
18	1.43E-03 (8.16E-04)	2.60E-02 (1.00E-02)	2.29E-03 (2.38E-03)	3.67E-03 (2.76E-03)	6.59E-03 (2.07E-03)	3.85E-03 (1.92E-03)
19	1.50E-03 (7.64E-04)	2.88E-02 (1.47E-02)	1.61E-03 (6.48E-04)	3.29E-03 (1.29E-03)	7.71E-03 (4.88E-03)	4.15E-03 (3.11E-03)
20	1.76E-03 (2.31E-03)	2.72E-02 (8.96E-03)	1.43E-03 (3.82E-04)	2.95E-03 (1.79E-03)	8.17E-03 (4.45E-03)	3.74E-03 (2.18E-03)
21	1.22E-03 (4.94E-04)	2.85E-02 (1.26E-02)	1.53E-03 (7.13E-04)	2.86E-03 (1.06E-03)	6.78E-03 (3.04E-03)	3.58E-03 (2.51E-03)
22	1.57E-03 (1.34E-03)	2.54E-02 (8.54E-03)	1.77E-03 (7.93E-04)	3.53E-03 (1.59E-03)	7.13E-03 (2.86E-03)	4.68E-03 (3.68E-03)
23	1.14E-03 (3.47E-04)	2.33E-02 (6.14E-03)	1.50E-03 (5.65E-04)	2.95E-03 (1.14E-03)	8.14E-03 (4.07E-03)	3.72E-03 (1.87E-03)
24	1.29E-03 (4.82E-04)	2.41E-02 (7.89E-03)	1.59E-03 (1.23E-03)	3.00E-03 (1.21E-03)	7.63E-03 (3.26E-03)	4.23E-03 (2.19E-03)
25	1.25E-03 (3.57E-04)	2.50E-02 (8.47E-03)	1.35E-03 (4.73E-04)	2.94E-03 (1.05E-03)	8.20E-03 (5.68E-03)	3.63E-03 (1.85E-03)
26	1.38E-03 (6.17E-04)	2.16E-02 (7.52E-03)	1.61E-03 (8.43E-04)	3.11E-03 (1.50E-03)	8.75E-03 (3.36E-03)	3.68E-03 (1.96E-03)
27	1.69E-03 (5.56E-04)	2.80E-02 (8.58E-03)	1.74E-03 (8.74E-04)	2.38E-03 (1.04E-03)	7.29E-03 (4.42E-03)	3.86E-03 (2.11E-03)
28	1.64E-03 (7.91E-04)	2.28E-02 (9.31E-03)	1.63E-03 (7.72E-04)	3.37E-03 (1.29E-03)	7.34E-03 (2.80E-03)	4.33E-03 (2.94E-03)
29	1.50E-03 (6.07E-04)	2.45E-02 (1.06E-02)	1.91E-03 (2.48E-03)	3.10E-03 (1.38E-03)	6.20E-03 (1.26E-03)	3.86E-03 (2.29E-03)
30	1.25E-03 (5.31E-04)	2.36E-02 (8.25E-03)	1.40E-03 (5.43E-04)	3.45E-03 (1.28E-03)	6.70E-03 (1.87E-03)	4.74E-03 (2.71E-03)
31	1.14E-03 (4.81E-04)	2.31E-02 (9.32E-03)	2.03E-03 (1.13E-03)	2.69E-03 (6.46E-04)	6.51E-03 (2.73E-03)	3.99E-03 (1.84E-03)
32	1.56E-03 (7.71E-04)	2.55E-02 (9.26E-03)	1.36E-03 (2.91E-04)	2.91E-03 (1.32E-03)	7.71E-03 (4.11E-03)	4.25E-03 (3.62E-03)
33	1.43E-03 (8.09E-04)	2.37E-02 (8.40E-03)	1.72E-03 (8.39E-04)	3.73E-03 (3.43E-03)	7.94E-03 (3.91E-03)	3.98E-03 (2.11E-03)
34	1.30E-03 (5.34E-04)	2.35E-02 (7.57E-03)	1.24E-03 (3.07E-04)	2.96E-03 (1.32E-03)	7.21E-03 (3.28E-03)	3.79E-03 (1.75E-03)
35	1.33E-03 (5.80E-04)	2.31E-02 (6.75E-03)	1.74E-03 (6.33E-04)	3.27E-03 (1.42E-03)	8.52E-03 (3.00E-03)	4.23E-03 (2.79E-03)
36	1.12E-03 (4.14E-04)	2.40E-02 (7.60E-03)	1.56E-03 (6.33E-04)	3.35E-03 (1.32E-03)	5.90E-03 (1.54E-03)	3.50E-03 (1.67E-03)
37	1.41E-03 (5.67E-04)	2.61E-02 (1.22E-02)	2.12E-03 (3.03E-03)	2.83E-03 (9.58E-04)	8.64E-03 (4.26E-03)	4.29E-03 (2.28E-03)
38	1.36E-03 (5.59E-04)	2.75E-02 (1.11E-02)	1.35E-03 (6.25E-04)	3.44E-03 (2.22E-03)	8.83E-03 (4.72E-03)	3.36E-03 (1.80E-03)
39	1.51E-03 (6.37E-04)	2.59E-02 (7.92E-03)	1.31E-03 (4.68E-04)	4.21E-03 (4.58E-03)	8.57E-03 (4.58E-03)	3.76E-03 (1.57E-03)
40	1.41E-03 (7.30E-04)	2.61E-02 (9.37E-03)	1.41E-03 (5.41E-04)	2.52E-03 (7.69E-04)	9.20E-03 (5.27E-03)	4.66E-03 (4.27E-03)
41	1.42E-03 (7.27E-04)	2.11E-02 (8.30E-03)	1.52E-03 (4.49E-04)	4.02E-03 (3.87E-03)	9.06E-03 (4.94E-03)	3.81E-03 (2.03E-03)
42	1.53E-03 (1.92E-03)	2.74E-02 (1.39E-02)	1.70E-03 (1.02E-03)	3.75E-03 (1.79E-03)	7.32E-03 (3.24E-03)	4.34E-03 (2.43E-03)
43	1.28E-03 (4.60E-04)	2.33E-02 (7.66E-03)	1.50E-03 (9.43E-04)	3.14E-03 (1.01E-03)	7.68E-03 (4.30E-03)	3.73E-03 (1.84E-03)
44	1.38E-03 (4.99E-04)	2.19E-02 (8.02E-03)	1.65E-03 (7.07E-04)	3.52E-03 (1.36E-03)	8.17E-03 (5.06E-03)	3.66E-03 (2.00E-03)
45	1.26E-03 (5.52E-04)	2.59E-02 (1.31E-02)	1.60E-03 (6.70E-04)	3.75E-03 (2.88E-03)	6.60E-03 (1.86E-03)	3.41E-03 (1.87E-03)
46	1.61E-03 (5.98E-04)	2.44E-02 (1.10E-02)	1.44E-03 (4.83E-04)	3.16E-03 (1.19E-03)	7.31E-03 (2.74E-03)	3.79E-03 (1.80E-03)
47	1.20E-03 (3.61E-04)	2.06E-02 (7.95E-03)	1.37E-03 (7.40E-04)	4.25E-03 (5.72E-03)	7.77E-03 (3.05E-03)	3.85E-03 (2.56E-03)
48	1.84E-03 (1.89E-03)	2.44E-02 (7.34E-03)	1.79E-03 (1.80E-03)	3.16E-03 (1.49E-03)	7.07E-03 (2.73E-03)	3.30E-03 (1.57E-03)
49	1.55E-03 (6.98E-04)	2.50E-02 (8.05E-03)	1.31E-03 (6.70E-04)	3.74E-03 (3.22E-03)	5.93E-03 (1.53E-03)	4.20E-03 (1.95E-03)
50	1.86E-03 (2.53E-03)	2.37E-02 (9.80E-03)	1.31E-03 (4.71E-04)	3.10E-03 (2.57E-03)	9.50E-03 (5.55E-03)	3.60E-03 (2.25E-03)
t/w/l	–	0/0/50	46/0/4	0/0/50	0/0/50	0/0/50

TABLE S18: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in problem 5 in test suite 3. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 50 component tasks in problem 5 in test suite 3.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	6.96E-01 (1.15E-01)	2.32E+00 (4.09E-01)	1.07E+00 (1.86E-01)	1.30E+00 (2.70E-01)	1.32E-01 (2.97E-02)	1.27E+00 (2.24E-01)
2	6.83E-01 (1.69E-01)	1.95E+00 (3.25E-01)	9.62E-01 (1.89E-01)	1.15E+00 (1.99E-01)	1.23E-01 (2.25E-02)	1.20E+00 (3.19E-01)
3	6.76E-01 (1.78E-01)	1.98E+00 (3.29E-01)	1.04E+00 (1.91E-01)	1.32E+00 (1.83E-01)	1.33E-01 (3.45E-02)	1.33E+00 (2.97E-01)
4	6.35E-01 (1.29E-01)	1.98E+00 (2.87E-01)	1.06E+00 (1.87E-01)	1.37E+00 (2.43E-01)	1.31E-01 (3.58E-02)	1.26E+00 (3.36E-01)
5	6.60E-01 (1.26E-01)	2.14E+00 (2.83E-01)	9.67E-01 (1.40E-01)	1.29E+00 (2.28E-01)	1.23E-01 (2.72E-02)	1.32E+00 (3.40E-01)
6	6.92E-01 (9.90E-02)	2.03E+00 (3.32E-01)	9.26E-01 (1.26E-01)	1.28E+00 (2.46E-01)	1.28E-01 (2.27E-02)	1.31E+00 (2.34E-01)
7	6.72E-01 (1.28E-01)	2.15E+00 (3.74E-01)	1.05E+00 (1.60E-01)	1.28E+00 (2.01E-01)	1.30E-01 (3.04E-02)	1.25E+00 (3.40E-01)
8	7.23E-01 (1.81E-01)	2.19E+00 (3.47E-01)	1.02E+00 (2.22E-01)	1.31E+00 (2.54E-01)	1.38E-01 (3.03E-02)	1.27E+00 (2.62E-01)
9	6.42E-01 (1.40E-01)	2.09E+00 (4.19E-01)	1.00E+00 (2.24E-01)	1.31E+00 (1.92E-01)	1.26E-01 (2.66E-02)	1.29E+00 (2.45E-01)
10	6.48E-01 (1.28E-01)	2.03E+00 (2.61E-01)	9.50E-01 (1.69E-01)	1.24E+00 (2.41E-01)	1.25E-01 (2.31E-02)	1.31E+00 (2.85E-01)
11	6.36E-01 (7.83E-02)	2.08E+00 (2.03E-01)	1.02E+00 (2.38E-01)	1.34E+00 (2.36E-01)	1.27E-01 (2.16E-02)	1.31E+00 (3.56E-01)
12	6.33E-01 (9.55E-02)	2.06E+00 (2.64E-01)	1.06E+00 (2.22E-01)	1.40E+00 (3.53E-01)	1.39E-01 (3.01E-02)	1.30E+00 (2.61E-01)
13	6.24E-01 (1.13E-01)	2.08E+00 (4.71E-01)	9.97E-01 (2.17E-01)	1.34E+00 (1.92E-01)	1.32E-01 (2.68E-02)	1.29E+00 (2.37E-01)
14	6.67E-01 (1.15E-01)	2.09E+00 (3.04E-01)	1.05E+00 (1.40E-01)	1.41E+00 (3.88E-01)	1.29E-01 (3.40E-02)	1.24E+00 (2.60E-01)
15	6.54E-01 (1.36E-01)	2.14E+00 (3.74E-01)	1.02E+00 (2.02E-01)	1.39E+00 (2.24E-01)	1.23E-01 (3.67E-02)	1.32E+00 (3.40E-01)
16	6.63E-01 (1.24E-01)	2.29E+00 (3.48E-01)	9.47E-01 (1.84E-01)	1.25E+00 (2.98E-01)	1.36E-01 (4.08E-02)	1.37E+00 (3.66E-01)
17	6.84E-01 (1.22E-01)	2.18E+00 (3.64E-01)	1.06E+00 (1.77E-01)	1.34E+00 (2.10E-01)	1.27E-01 (2.25E-02)	1.31E+00 (2.53E-01)
18	6.22E-01 (8.19E-02)	2.22E+00 (3.93E-01)	1.06E+00 (1.62E-01)	1.40E+00 (2.71E-01)	1.12E-01 (3.44E-02)	1.21E+00 (2.25E-01)
19	6.51E-01 (1.30E-01)	2.26E+00 (2.53E-01)	1.03E+00 (1.43E-01)	1.33E+00 (2.22E-01)	1.33E-01 (3.48E-02)	1.32E+00 (2.92E-01)
20	6.11E-01 (6.05E-02)	2.13E+00 (3.75E-01)	1.10E+00 (1.60E-01)	1.40E+00 (2.23E-01)	1.32E-01 (3.03E-02)	1.33E+00 (2.83E-01)
21	6.69E-01 (1.60E-01)	2.26E+00 (4.22E-01)	9.78E-01 (1.86E-01)	1.48E+00 (2.59E-01)	1.36E-01 (2.59E-02)	1.28E+00 (2.37E-01)
22	6.63E-01 (1.04E-01)	2.23E+00 (2.75E-01)	1.05E+00 (1.79E-01)	1.36E+00 (2.39E-01)	1.36E-01 (3.30E-02)	1.30E+00 (2.62E-01)
23	6.43E-01 (9.89E-02)	2.11E+00 (3.59E-01)	9.83E-01 (2.06E-01)	1.31E+00 (2.07E-01)	1.24E-01 (2.40E-02)	1.27E+00 (3.13E-01)
24	6.18E-01 (9.40E-02)	2.22E+00 (4.80E-01)	1.01E+00 (1.88E-01)	1.35E+00 (2.53E-01)	1.39E-01 (3.09E-02)	1.34E+00 (2.27E-01)
25	6.63E-01 (1.45E-01)	2.20E+00 (2.93E-01)	1.02E+00 (2.00E-01)	1.26E+00 (2.17E-01)	1.21E-01 (2.77E-02)	1.34E+00 (2.89E-01)
26	6.11E-01 (1.25E-01)	2.15E+00 (2.69E-01)	9.97E-01 (1.90E-01)	1.46E+00 (3.10E-01)	1.30E-01 (2.50E-02)	1.30E+00 (2.70E-01)
27	6.21E-01 (9.58E-02)	2.14E+00 (3.18E-01)	1.04E+00 (1.56E-01)	1.37E+00 (2.92E-01)	1.24E-01 (3.49E-02)	1.32E+00 (2.53E-01)
28	6.39E-01 (1.24E-01)	2.11E+00 (3.08E-01)	1.04E+00 (1.85E-01)	1.41E+00 (2.43E-01)	1.33E-01 (2.57E-02)	1.40E+00 (3.04E-01)
29	7.00E-01 (1.27E-01)	2.05E+00 (3.20E-01)	9.86E-01 (1.78E-01)	1.34E+00 (2.46E-01)	1.31E-01 (3.67E-02)	1.25E+00 (3.62E-01)
30	6.55E-01 (1.65E-01)	2.06E+00 (3.08E-01)	1.02E+00 (1.63E-01)	1.31E+00 (2.04E-01)	1.32E-01 (3.11E-02)	1.27E+00 (3.33E-01)
31	6.27E-01 (1.25E-01)	2.21E+00 (3.67E-01)	1.02E+00 (2.09E-01)	1.25E+00 (2.44E-01)	1.38E-01 (2.91E-02)	1.23E+00 (3.30E-01)
32	6.84E-01 (1.23E-01)	2.31E+00 (5.00E-01)	9.90E-01 (1.87E-01)	1.38E+00 (3.07E-01)	1.32E-01 (3.36E-02)	1.30E+00 (2.64E-01)
33	6.80E-01 (1.42E-01)	2.05E+00 (2.88E-01)	1.04E+00 (1.47E-01)	1.48E+00 (1.82E-01)	1.36E-01 (3.25E-02)	1.27E+00 (2.69E-01)
34	6.72E-01 (1.06E-01)	2.30E+00 (3.05E-01)	9.89E-01 (1.92E-01)	1.55E+00 (1.91E-01)	1.32E-01 (2.55E-02)	1.39E+00 (3.52E-01)
35	6.36E-01 (8.89E-02)	2.09E+00 (3.01E-01)	1.03E+00 (2.15E-01)	1.31E+00 (1.88E-01)	1.44E-01 (3.38E-02)	1.36E+00 (3.60E-01)
36	6.58E-01 (1.09E-01)	2.10E+00 (3.51E-01)	1.02E+00 (1.63E-01)	1.36E+00 (2.03E-01)	1.23E-01 (2.35E-02)	1.33E+00 (3.13E-01)
37	6.71E-01 (1.19E-01)	2.10E+00 (2.52E-01)	9.29E-01 (1.60E-01)	1.32E+00 (2.75E-01)	1.23E-01 (2.11E-02)	1.28E+00 (2.98E-01)
38	6.88E-01 (1.24E-01)	2.08E+00 (3.80E-01)	1.03E+00 (1.62E-01)	1.42E+00 (2.50E-01)	1.30E-01 (2.64E-02)	1.36E+00 (2.69E-01)
39	7.00E-01 (1.32E-01)	2.18E+00 (2.92E-01)	9.85E-01 (1.48E-01)	1.36E+00 (1.64E-01)	1.29E-01 (3.91E-02)	1.28E+00 (3.68E-01)
40	6.73E-01 (1.11E-01)	2.19E+00 (2.17E-01)	1.11E+00 (2.58E-01)	1.36E+00 (2.43E-01)	1.35E-01 (2.89E-02)	1.36E+00 (2.89E-01)
41	7.05E-01 (1.28E-01)	2.11E+00 (2.83E-01)	1.07E+00 (2.30E-01)	1.37E+00 (2.00E-01)	1.26E-01 (2.66E-02)	1.31E+00 (3.06E-01)
42	6.42E-01 (9.66E-02)	2.18E+00 (2.98E-01)	9.98E-01 (1.61E-01)	1.33E+00 (2.55E-01)	1.29E-01 (2.53E-02)	1.34E+00 (2.60E-01)
43	7.02E-01 (1.03E-01)	2.14E+00 (2.96E-01)	9.16E-01 (1.56E-01)	1.43E+00 (1.74E-01)	1.23E-01 (3.34E-02)	1.30E+00 (4.07E-01)
44	6.59E-01 (1.48E-01)	2.16E+00 (2.89E-01)	1.01E+00 (1.93E-01)	1.36E+00 (2.32E-01)	1.29E-01 (3.42E-02)	1.23E+00 (2.30E-01)
45	6.52E-01 (1.09E-01)	2.09E+00 (2.90E-01)	9.60E-01 (1.46E-01)	1.40E+00 (2.77E-01)	1.28E-01 (3.27E-02)	1.22E+00 (2.59E-01)
46	6.66E-01 (1.05E-01)	2.13E+00 (4.15E-01)	9.99E-01 (1.99E-01)	1.46E+00 (2.49E-01)	1.32E-01 (1.90E-02)	1.33E+00 (3.35E-01)
47	6.22E-01 (1.05E-01)	2.13E+00 (2.80E-01)	1.05E+00 (1.50E-01)	1.36E+00 (1.73E-01)	1.30E-01 (2.42E-02)	1.40E+00 (3.65E-01)
48	6.61E-01 (1.13E-01)	2.16E+00 (3.13E-01)	1.02E+00 (1.73E-01)	1.34E+00 (2.22E-01)	1.24E-01 (3.94E-02)	1.27E+00 (3.24E-01)
49	6.72E-01 (9.84E-02)	2.11E+00 (4.36E-01)	1.06E+00 (1.76E-01)	1.34E+00 (1.73E-01)	1.35E-01 (2.62E-02)	1.35E+00 (3.37E-01)
50	6.58E-01 (1.02E-01)	2.09E+00 (3.59E-01)	1.03E+00 (1.64E-01)	1.41E+00 (1.94E-01)	1.42E-01 (3.13E-02)	1.37E+00 (3.75E-01)
t/w/l	-	0/0/50	0/0/50	0/0/50	0/50/0	0/0/50

TABLE S19: Comparison of AEMTO, AEMTO (w/o aTsf and aSel), MaTDE, SBO, MFEA2 and STO in terms of the mean and standard deviation (in brackets) of the best-achieved FEVs over 20 runs w.r.t. each component task in problem 6 in test suite 3. The last row shows a summary of statistically comparing AEMTO (control method) with each of the others via Wilcoxon's rank-sum test, with the result represented by ("t/w/l"), over all 50 component tasks in problem 6 in test suite 3.

Component Task	AEMTO	AEMTO (w/o aTsf and aSel)	MaTDE	SBO	MFEA2	STO
1	2.60E-04 (1.56E-04)	5.55E-02 (2.40E-02)	1.79E+00 (1.05E+00)	1.14E+04 (1.20E+03)	8.42E+02 (3.42E+02)	1.18E+04 (1.30E+03)
2	2.25E-04 (1.23E-04)	5.73E-02 (2.13E-02)	2.06E+00 (9.50E-01)	1.16E+04 (1.22E+03)	8.33E+02 (2.89E+02)	1.24E+04 (5.38E+02)
3	2.83E-04 (9.72E-05)	4.86E-02 (2.44E-02)	1.99E+00 (1.15E+00)	1.14E+04 (1.16E+03)	7.24E+02 (3.13E+02)	1.17E+04 (1.24E+03)
4	2.32E-04 (8.23E-05)	4.68E-02 (1.58E-02)	1.82E+00 (6.16E-01)	1.14E+04 (1.27E+03)	7.57E+02 (2.59E+02)	1.18E+04 (1.05E+03)
5	2.44E-04 (1.47E-04)	5.05E-02 (2.47E-02)	1.65E+00 (7.40E-01)	1.14E+04 (1.14E+03)	8.61E+02 (3.98E+02)	1.20E+04 (9.88E+02)
6	2.53E-04 (1.06E-04)	4.78E-02 (1.89E-02)	2.33E+00 (1.76E+00)	1.15E+04 (1.32E+03)	9.09E+02 (3.38E+02)	1.14E+04 (1.55E+03)
7	2.02E-04 (7.83E-05)	5.33E-02 (3.16E-02)	2.04E+00 (1.06E+00)	1.16E+04 (1.18E+03)	8.07E+02 (3.49E+02)	1.15E+04 (1.14E+03)
8	2.73E-04 (1.52E-04)	5.03E-02 (2.06E-02)	1.89E+00 (1.25E+00)	1.14E+04 (1.39E+03)	9.54E+02 (3.36E+02)	1.21E+04 (8.17E+02)
9	2.10E-04 (1.12E-04)	4.49E-02 (2.18E-02)	1.82E+00 (8.04E-01)	1.12E+04 (1.56E+03)	8.23E+02 (3.29E+02)	1.16E+04 (1.23E+03)
10	2.25E-04 (7.61E-05)	5.22E-02 (3.14E-02)	1.89E+00 (8.41E-01)	1.13E+04 (1.25E+03)	8.74E+02 (3.25E+02)	1.24E+04 (7.34E+02)
11	2.24E-04 (1.43E-04)	3.81E-02 (1.37E-02)	1.76E+00 (1.02E+00)	1.12E+04 (1.46E+03)	7.96E+02 (3.01E+02)	1.18E+04 (1.14E+03)
12	2.08E-04 (6.11E-05)	5.13E-02 (2.28E-02)	1.98E+00 (1.24E+00)	1.16E+04 (1.23E+03)	8.00E+02 (2.43E+02)	1.17E+04 (1.16E+03)
13	2.16E-04 (9.82E-05)	4.65E-02 (1.82E-02)	1.65E+00 (9.01E-01)	1.15E+04 (1.24E+03)	8.90E+02 (2.64E+02)	1.15E+04 (8.77E+02)
14	2.51E-04 (1.38E-04)	4.59E-02 (2.74E-02)	1.98E+00 (1.01E+00)	1.16E+04 (1.10E+03)	8.74E+02 (4.13E+02)	1.16E+04 (1.29E+03)
15	2.45E-04 (1.03E-04)	4.27E-02 (1.77E-02)	1.77E+00 (7.72E-01)	1.14E+04 (1.16E+03)	8.47E+02 (3.19E+02)	1.21E+04 (1.02E+03)
16	1.67E-04 (1.01E-04)	4.87E-02 (2.80E-02)	2.53E+00 (1.14E+00)	1.16E+04 (1.36E+03)	9.77E+02 (2.50E+02)	1.19E+04 (1.16E+03)
17	2.80E-04 (1.59E-04)	5.09E-02 (3.09E-02)	1.94E+00 (8.31E-01)	1.13E+04 (1.46E+03)	9.20E+02 (3.64E+02)	1.20E+04 (9.14E+02)
18	1.97E-04 (1.03E-04)	4.26E-02 (1.51E-02)	1.84E+00 (6.08E-01)	1.13E+04 (1.20E+03)	8.11E+02 (2.59E+02)	1.18E+04 (9.93E+02)
19	2.37E-04 (1.25E-04)	5.70E-02 (2.17E-02)	2.09E+00 (9.55E-01)	1.13E+04 (1.32E+03)	9.34E+02 (2.18E+02)	1.20E+04 (7.88E+02)
20	2.57E-04 (1.31E-04)	5.34E-02 (2.98E-02)	2.31E+00 (1.46E+00)	1.11E+04 (1.34E+03)	8.20E+02 (2.65E+02)	1.19E+04 (9.76E+02)
21	2.25E-04 (6.78E-05)	5.81E-02 (2.53E-02)	2.12E+00 (9.10E-01)	1.13E+04 (1.30E+03)	9.33E+02 (3.34E+02)	1.15E+04 (1.28E+03)
22	2.10E-04 (1.54E-04)	3.95E-02 (2.49E-02)	1.46E+00 (7.35E-01)	1.11E+04 (1.48E+03)	8.41E+02 (2.94E+02)	1.24E+04 (5.98E+02)
23	1.76E-04 (1.08E-04)	4.21E-02 (1.93E-02)	1.53E+00 (6.37E-01)	1.12E+04 (1.47E+03)	7.80E+02 (2.27E+02)	1.19E+04 (9.55E+02)
24	2.50E-04 (1.36E-04)	4.64E-02 (2.49E-02)	2.27E+00 (1.84E+00)	1.13E+04 (1.38E+03)	8.75E+02 (2.72E+02)	1.21E+04 (9.63E+02)
25	2.36E-04 (1.33E-04)	4.79E-02 (1.99E-02)	1.77E+00 (9.25E-01)	1.15E+04 (1.05E+03)	7.61E+02 (3.01E+02)	1.10E+04 (1.60E+03)
26	3.18E-04 (1.89E-04)	5.54E-02 (2.06E-02)	2.08E+00 (9.04E-01)	1.15E+04 (1.31E+03)	7.27E+02 (2.87E+02)	1.21E+04 (7.56E+02)
27	2.37E-04 (1.01E-04)	4.26E-02 (1.16E-02)	1.94E+00 (7.89E-01)	1.16E+04 (1.29E+03)	9.50E+02 (2.86E+02)	1.16E+04 (1.21E+03)
28	2.04E-04 (8.06E-05)	4.67E-02 (2.18E-02)	1.72E+00 (1.14E+00)	1.13E+04 (1.36E+03)	8.07E+02 (2.60E+02)	1.18E+04 (7.12E+02)
29	2.74E-04 (1.46E-04)	4.72E-02 (1.72E-02)	2.01E+00 (7.84E-01)	1.14E+04 (1.43E+03)	9.29E+02 (2.72E+02)	1.15E+04 (1.53E+03)
30	2.32E-04 (1.16E-04)	4.86E-02 (1.69E-02)	2.04E+00 (8.18E-01)	1.14E+04 (1.32E+03)	7.96E+02 (2.29E+02)	1.18E+04 (8.22E+02)
31	2.39E-04 (1.26E-04)	4.88E-02 (1.86E-02)	2.05E+00 (1.22E+00)	1.15E+04 (1.28E+03)	9.34E+02 (2.77E+02)	1.21E+04 (9.64E+02)
32	3.06E-04 (3.12E-04)	5.05E-02 (2.09E-02)	1.61E+00 (9.64E-01)	1.14E+04 (1.20E+03)	8.19E+02 (3.22E+02)	1.21E+04 (1.05E+03)
33	1.82E-04 (9.86E-05)	6.10E-02 (2.04E-02)	2.06E+00 (1.03E+00)	1.15E+04 (1.44E+03)	9.62E+02 (3.59E+02)	1.12E+04 (2.15E+03)
34	2.16E-04 (1.35E-04)	4.46E-02 (2.00E-02)	1.84E+00 (9.17E-01)	1.14E+04 (1.20E+03)	9.98E+02 (3.53E+02)	1.17E+04 (1.47E+03)
35	2.63E-04 (1.81E-04)	5.26E-02 (2.09E-02)	2.35E+00 (1.25E+00)	1.12E+04 (1.16E+03)	9.27E+02 (2.85E+02)	1.18E+04 (9.28E+02)
36	2.56E-04 (1.15E-04)	4.75E-02 (2.32E-02)	2.04E+00 (8.39E-01)	1.13E+04 (1.30E+03)	9.23E+02 (2.67E+02)	1.12E+04 (1.40E+03)
37	2.33E-04 (1.21E-04)	4.40E-02 (1.71E-02)	1.91E+00 (1.54E+00)	1.16E+04 (1.15E+03)	8.06E+02 (3.56E+02)	1.18E+04 (1.08E+03)
38	1.91E-04 (9.04E-05)	5.53E-02 (2.36E-02)	1.69E+00 (9.95E-01)	1.13E+04 (1.38E+03)	8.68E+02 (2.76E+02)	1.19E+04 (1.01E+03)
39	2.54E-04 (1.07E-04)	4.41E-02 (1.92E-02)	1.81E+00 (8.98E-01)	1.14E+04 (1.37E+03)	9.86E+02 (2.86E+02)	1.19E+04 (8.79E+02)
40	2.36E-04 (1.39E-04)	5.13E-02 (2.42E-02)	2.22E+00 (1.16E+00)	1.13E+04 (1.46E+03)	7.60E+02 (3.10E+02)	1.19E+04 (1.30E+03)
41	2.95E-04 (1.28E-04)	5.66E-02 (3.02E-02)	2.43E+00 (1.22E+00)	1.17E+04 (1.39E+03)	8.43E+02 (3.22E+02)	1.19E+04 (1.03E+03)
42	2.29E-04 (1.05E-04)	3.76E-02 (1.60E-02)	1.70E+00 (8.38E-01)	1.12E+04 (1.41E+03)	8.03E+02 (4.02E+02)	1.22E+04 (7.87E+02)
43	2.23E-04 (1.37E-04)	5.14E-02 (2.49E-02)	1.36E+00 (4.90E-01)	1.13E+04 (1.40E+03)	6.82E+02 (1.97E+02)	1.20E+04 (8.15E+02)
44	2.77E-04 (1.00E-04)	5.22E-02 (2.12E-02)	2.05E+00 (1.97E+00)	1.13E+04 (1.45E+03)	9.03E+02 (3.02E+02)	1.16E+04 (1.36E+03)
45	2.36E-04 (1.13E-04)	5.63E-02 (2.74E-02)	2.18E+00 (9.97E-01)	1.13E+04 (1.25E+03)	9.23E+02 (3.31E+02)	1.15E+04 (1.90E+03)
46	2.91E-04 (2.06E-04)	5.47E-02 (1.94E-02)	2.31E+00 (1.15E+00)	1.17E+04 (1.21E+03)	9.01E+02 (2.80E+02)	1.16E+04 (9.92E+02)
47	2.84E-04 (1.42E-04)	6.33E-02 (2.07E-02)	2.61E+00 (2.24E+00)	1.14E+04 (1.49E+03)	8.74E+02 (2.68E+02)	1.18E+04 (1.46E+03)
48	1.91E-04 (8.30E-05)	4.28E-02 (1.43E-02)	1.55E+00 (7.19E-01)	1.15E+04 (1.14E+03)	8.22E+02 (2.59E+02)	1.16E+04 (1.20E+03)
49	2.43E-04 (1.07E-04)	4.80E-02 (1.79E-02)	2.22E+00 (1.23E+00)	1.15E+04 (1.39E+03)	8.38E+02 (4.04E+02)	1.17E+04 (1.48E+03)
50	1.87E-04 (6.71E-05)	3.89E-02 (1.63E-02)	1.64E+00 (8.49E-01)	1.14E+04 (1.33E+03)	9.52E+02 (2.37E+02)	1.17E+04 (1.12E+03)
t/w/l	—	0/0/50	0/0/50	0/0/50	0/0/50	0/0/50