

Enhanced Multi-operator Differential Evolution for Constrained Optimization(**Supplementary Material**)

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APPENDIX A

BEST AND AVERAGE FITNESS VALUES (FV) ACHIEVED BY E-MODE AND 4 STATE-OF-THE-ART ALGORITHMS, WHERE “*” REFERS TO INFEASIBLE SOLUTIONS. E-MODE² MEANS THAT THE LOWER AND UPPER LIMITS OF F AND C_T ARE 0 AND 1, RESPECTIVELY.

Prob.	Algorithm	10D			30D		
		Best FV	Average FV	Std.	Best FV	Average FV	Std.
C01	E-MODE	-7.473104E-01	-7.473104E-01	2.451306E-16	-8.21884E-01	-8.19898E-01	2.86297E-03
	SAMO-DE	-7.473104E-01	-7.470402E-01	1.350638E-03	-8.218838E-01	-8.143674E-01	4.766000E-03
	DE-DPS	-7.473104E-01	-7.473104E-01	2.26623E-16	-8.21884E-01	-8.212036E-01	1.79648E-03
	ε DEag	-7.473104E-01	-7.470402E-01	1.323339E-03	-8.218255E-01	-8.208687E-01	7.103893E-04
	ECHT-ARMOR-DE	-7.4730E-01	-7.4700E-01	1.4E-03	-8.1806E-01	-7.8992E-01	2.51E-02
C02	E-MODE	-2.277710E+00	-1.966335E+00	2.685820E-01	-2.28097E+00	-2.10320E+00	1.15158E-01
	E-MODE ²	-2.277711E+00	-2.277711E+00	2.540214E-10	-2.28097E+00	-2.27623E+00	4.89723E-03
	SAMO-DE	-2.277709E+00	-2.276842E+00	1.154957E-03	-2.280962E+00	-2.276111E+00	3.706000E-03
	DE-DPS	-2.277711E+00	-2.277512E+00	2.54035E-04	-2.280671	-2.244631	5.20548E-02
	ε DEag	-2.277702E+00	-2.269502E+00	2.3897790E-02	-2.169248E+00	-2.151424E+00	1.197582E-02
	ECHT-ARMOR-DE	-2.2777E+00	-2.2770E+00	3.3E-03	-2.2607E+00	-2.1706E+00	7.36E-02
C03	E-MODE	0.000000E+00	0.000000E+00	0.000000E+00	0.00000E+00	3.12360E-25	5.72975E-25
	SAMO-DE	0.000000E+00	4.1730E-23	1.6405100E-22	4.5996E-24	4.8260E-22	1.1460E-21
	DE-DPS	0.000000E+00	0.000000E+00	0.000000E+00	1.6200E-19	1.8479E-13	4.17994E-13
	ε DEag	0.000000E+00	0.000000E+00	0.000000E+00	2.867347E+01	2.883785E+01	8.047159E-01
	ECHT-ARMOR-DE	0.000000E+00	0.000000E+00	0.000000E+00	2.5801E-24	2.6380E+01	7.94E+00
C04	E-MODE	-1.000000E-05	-1.000000E-05	0.00000E+00	-3.33333E-06	-3.33333E-06	2.45925E-16
	SAMO-DE	-1.000000E-05	-1.000000E-05	1.446083E-11	-3.2480E-06	-2.41130E-06	4.49234E-07
	DE-DPS	-1.000000E-05	-1.000000E-05	9.09633E-15	-3.3318E-06	-3.3123E-06	2.03926E-08
	ε DEag	-9.992345E-06	-9.918452E-06	1.5467300E-07	4.698111E-03	8.162973E-03	3.067785E-03
	ECHT-ARMOR-DE	-1.00000E-05	-1.00000E-05	0.00000E+00	-3.3326E-06	8.3713E-02	2.89E-01
C05	E-MODE	-4.836106E+02	-4.836106E+02	3.480934E-13	-4.83611E+02	-4.83611E+02	2.03634E-13
	SAMO-DE	-4.836106E+02	-4.836106E+02	4.14428E-06	-4.836106E+02	-4.836106E+02	5.389910E-06
	DE-DPS	-4.836106E+02	-4.836106E+02	1.25826E-10	-4.836106E+02	-4.836106E+02	4.42074E-06
	ε DEag	-4.836106E+02	-4.836106E+02	3.89035E-13	-4.531307E+02	-4.495460E+02	2.899105E+00
	ECHT-ARMOR-DE	-4.8361E+02	-4.8361E+02	0.0E+00	-4.8122E+02	-4.3335E+02	1.46E+02
C06	E-MODE	-5.786624E+02	-5.786624E+02	3.248872E-13	-5.30638E+02	-5.30638E+02	4.66102E-10
	SAMO-DE	-5.786624E+02	-5.786562E+02	9.35219E-03	-5.306368E+02	-5.306155E+02	1.288050E-02
	DE-DPS	-5.786624E+02	-5.78662E+02	8.05379E-04	-5.306379E+02	-5.306329E+02	5.89364E-03
	ε DEag	-5.786581E+02	-5.786528E+02	3.6271690E-03	-5.285750E+02	-5.279068E+02	4.748378E-01
	ECHT-ARMOR-DE	-5.7866E+02	-5.7866E+02	4.0E-13	-5.2465E+02	-4.8931E+02	1.32E+02
C07	E-MODE	0.000000E+00	0.000000E+00	0.0000000E+00	0.00000E+00	1.60513E-27	4.13547E-27
	SAMO-DE	0.000000E+00	7.762750E-23	3.8808000E-22	9.495250E-23	1.782790E-13	3.628040E-13
	DE-DPS	0.000000E+00	0.000000E+00	0.0000000E+00	5.48786E-20	1.03359E-13	2.20540E-13
	ε DEag	0.000000E+00	0.000000E+00	0.0000000E+00	1.147112E-15	2.603632E-15	1.233430E-15
	ECHT-ARMOR-DE	0.000000E+00	0.000000E+00	0.000000E+00	0.000000E+00	1.0789E-25	2.20E-25
C08	E-MODE	0.000000E+00	1.006621E+01	3.029575E+00	0.00000E+00	1.37398E-27	4.09125E-27
	SAMO-DE	0.000000E+00	2.520090E-25	1.2600470E-24	6.425810E-21	1.032930E-09	2.373300E-09
	DE-DPS	0.000000E+00	3.950387E+00	5.01904E+00	4.575719E-13	3.447568E-09	8.86366E-09
	ε DEag	0.000000E+00	6.727528E+00	5.560648E+00	2.518693E-14	7.831464E-14	4.855177E-14
	ECHT-ARMOR-DE	0.000000E+00	7.5262E+00	5.0E+00	0.000000E+00	2.0101E+01	4.70E+01
C09	E-MODE	0.00000E+00	0.00000E+00	0.0000000E+00	0.00000E+00	9.27762E-27	1.81923E-26
	SAMO-DE	0.000000E+00	5.089752E+00	2.4108277E+01	1.186170E-20	6.079667E+00	1.432599E+01
	DE-DPS	0.00000E+00	0.00000E+00	0.0000000E+00	3.81580E-23	5.29059E-14	1.27939E-13
	ε DEag	0.00000E+00	0.00000E+00	0.0000000E+00	2.770665E-16	1.072140E+01	2.821923E+01
	ECHT-ARMOR-DE	0.000000E+00	1.7633E-01	8.8E-01	0.000000E+00	4.6110E+00	2.31E+01

