

Table 3

Mean and standard deviation of the fitness error for the CEC 2017 test suite of 100D functions F1–F30 on 30 runs (the best entries are in bold).

No.	Metric	SaDE	CoDE	JADE	SHADE	AIWPSO	IMODE	QAGO
F1	Mean	3.55E+03	5.07E+02	0.00E+00	1.37E-02	7.08E+03	1.21E+08	0.00E+00
	Std	3.81E+03	7.49E+02	5.00E-16	2.04E-02	5.70E+03	3.76E+08	7.80E-16
F2	Mean	5.18E+29	1.64E+26	1.24E+01	7.24E+29	1.17E+48	7.19E+145	4.62E+01
	Std	1.64E+30	4.37E+26	3.28E+01	4.45E+29	1.84E+48	1.81E+146	1.46E+02
F3	Mean	4.62E+03	1.10E+00	3.10E+04	1.83E+04	3.00E+03	6.99E-05	2.46E-05
	Std	2.26E+03	1.25E+00	6.54E+04	5.78E+04	1.63E+03	1.33E-06	3.71E-05
F4	Mean	2.06E+02	1.54E+02	5.00E+01	1.74E+02	2.39E+02	9.43E+01	9.98E+01
	Std	4.68E+01	4.27E+01	6.46E+01	6.22E+01	6.69E+01	9.22E+01	3.97E+01
F5	Mean	4.06E+02	1.93E+02	2.63E+02	2.75E+02	7.00E+02	9.86E+02	1.23E+02
	Std	5.55E+01	3.07E+01	2.55E+01	4.27E+01	7.07E+01	6.95E+01	1.71E+01
F6	Mean	2.56E-01	1.20E-06	2.77E-03	1.86E+00	2.65E+00	6.15E+01	3.09E-03
	Std	2.61E-01	1.72E-06	8.76E-03	1.56E+00	4.04E-01	2.43E+00	2.19E-03
F7	Mean	8.18E+02	3.09E+02	5.15E+02	6.37E+02	1.02E+03	2.33E+03	2.19E+02
	Std	1.21E+02	3.98E+01	7.02E+01	1.36E+02	1.58E+02	5.02E+02	2.01E+01
F8	Mean	4.68E+02	1.79E+02	2.81E+02	2.84E+02	6.62E+02	1.06E+03	1.27E+02
	Std	4.69E+01	2.72E+01	3.41E+01	3.88E+01	5.80E+01	1.03E+02	1.59E+01
F9	Mean	7.33E+03	1.75E+02	4.49E+03	6.07E+03	1.93E+04	3.01E+04	1.10E+02
	Std	1.14E+03	1.64E+02	1.43E+03	1.89E+03	2.68E+03	4.50E+03	9.67E+01
F10	Mean	1.10E+04	1.14E+04	1.21E+04	1.04E+04	1.30E+04	1.15E+04	1.41E+04
	Std	1.29E+03	1.45E+03	6.13E+02	6.03E+02	1.43E+03	1.18E+03	8.24E+03
F11	Mean	4.79E+02	1.52E+02	5.48E+02	1.32E+03	1.35E+04	1.39E+03	2.08E+02
	Std	1.29E+02	5.09E+01	9.56E+01	2.51E+02	3.99E+04	3.43E+02	3.59E+01
F12	Mean	2.71E+05	2.16E+05	3.94E+05	2.18E+05	6.16E+05	4.26E+03	1.40E+05
	Std	1.34E+05	7.44E+04	3.04E+05	2.32E+05	3.48E+05	8.45E+02	5.56E+04
F13	Mean	9.48E+03	2.98E+03	4.38E+03	7.81E+03	1.34E+04	6.15E+02	2.18E+03
	Std	4.66E+03	4.24E+03	3.46E+03	3.20E+03	2.66E+04	9.71E+01	2.93E+03
F14	Mean	1.81E+04	9.23E+03	9.71E+02	7.16E+02	2.43E+05	4.55E+02	2.33E+02
	Std	1.29E+04	6.56E+03	6.39E+02	3.06E+02	1.37E+05	9.10E+01	5.00E+01
F15	Mean	1.90E+03	1.46E+03	2.35E+03	3.44E+03	4.64E+03	2.69E+02	5.95E+02
	Std	3.26E+03	1.16E+03	3.90E+03	6.72E+03	4.61E+03	6.86E+01	5.62E+02
F16	Mean	2.53E+03	2.56E+03	2.69E+03	2.60E+03	4.01E+03	4.42E+03	2.51E+03
	Std	4.97E+02	4.87E+02	4.19E+02	3.28E+02	5.71E+02	8.63E+02	1.03E+03
F17	Mean	1.95E+03	1.80E+03	1.98E+03	2.51E+03	3.63E+03	3.79E+03	1.96E+03
	Std	4.26E+02	3.46E+02	3.95E+02	2.60E+02	3.92E+02	8.08E+02	4.38E+02
F18	Mean	1.07E+05	7.98E+04	5.12E+05	3.39E+03	3.10E+05	9.27E+02	6.74E+03
	Std	3.12E+04	4.62E+04	1.61E+06	4.60E+03	4.81E+04	2.01E+03	3.18E+03
F19	Mean	1.12E+03	6.88E+02	7.54E+02	4.45E+02	7.12E+03	6.20E+02	9.98E+02
	Std	1.21E+03	7.12E+02	6.63E+02	2.02E+02	5.74E+03	3.40E+02	2.02E+03
F20	Mean	1.84E+03	2.17E+03	1.90E+03	2.09E+03	3.31E+03	3.05E+03	2.21E+03
	Std	2.94E+02	3.11E+02	2.47E+02	2.62E+02	3.03E+02	4.26E+02	3.82E+02
F21	Mean	6.09E+02	3.89E+02	4.78E+02	5.10E+02	1.05E+03	1.44E+03	3.52E+02
	Std	6.34E+01	2.10E+01	2.95E+01	5.27E+01	1.63E+02	1.23E+02	1.56E+01
F22	Mean	1.27E+04	1.31E+04	1.30E+04	1.22E+04	1.43E+04	1.37E+04	7.66E+03
	Std	1.00E+03	1.49E+03	1.02E+03	8.21E+02	1.32E+03	9.68E+02	2.35E+03
F23	Mean	9.03E+02	6.80E+02	7.31E+02	9.18E+02	9.60E+02	1.97E+03	6.30E+02
	Std	3.82E+01	2.23E+01	3.74E+01	8.54E+01	7.69E+01	1.32E+02	2.38E+01
F24	Mean	1.56E+03	1.05E+03	1.21E+03	1.42E+03	1.55E+03	2.86E+03	1.03E+03
	Std	1.16E+02	2.46E+01	9.38E+01	1.13E+02	9.69E+01	3.78E+02	3.12E+01
F25	Mean	7.59E+02	7.39E+02	7.67E+02	8.04E+02	7.49E+02	7.34E+02	8.05E+02
	Std	7.11E+01	5.83E+01	7.17E+01	7.97E+01	7.90E+01	4.60E+01	6.43E+01
F26	Mean	1.42E+04	4.89E+03	7.13E+03	8.04E+03	8.96E+03	1.32E+04	5.24E+03
	Std	2.50E+03	4.03E+02	6.50E+02	6.45E+02	5.77E+03	2.68E+03	3.79E+02
F27	Mean	1.14E+03	6.59E+02	9.32E+02	9.00E+02	5.37E+02	1.59E+03	6.99E+02
	Std	8.14E+01	3.05E+01	1.29E+02	1.08E+02	1.93E+01	3.01E+02	3.41E+01
F28	Mean	5.44E+02	5.55E+02	5.27E+02	5.57E+02	6.13E+02	5.21E+02	5.54E+02
	Std	2.87E+01	2.75E+01	4.31E+01	2.84E+01	5.30E+01	4.10E+01	2.78E+01
F29	Mean	2.83E+03	2.32E+03	2.50E+03	3.00E+03	3.05E+03	4.43E+03	1.48E+03
	Std	3.91E+02	4.44E+02	3.28E+02	2.94E+02	7.35E+02	5.18E+02	3.39E+02
F30	Mean	6.94E+03	2.92E+03	4.20E+03	4.89E+03	5.42E+06	8.95E+03	2.57E+03
	Std	3.95E+03	6.48E+02	1.94E+03	3.21E+03	6.98E+06	1.70E+03	2.93E+02