

## CEC 2022 Benchmark Functions

### baseCSA and modifiedCSA comparison with seven other Meta-Heuristic Algorithms

Function	BestAlgorithm	BaseCSA_Mean	ModCSA_Mean	ABC_Mean	DE_Mean	GA_custom_Mean	GWO_Mean	PSO_Mean	SSA_Mean	WOA_Mean
F1	DE	82450.12155	67048.2329	98113.40242	300	3660.420483	13182.37788	300	300.1816082	70479.37332
F2	ABC	4134.428539	5472.448182	400.0167585	400.4035316	468.827828	448.6323396	554.7481205	401.9363911	2527.227692
F3	DE	676.6774209	687.4023763	600	600	652.3565538	607.0277609	608.0112632	615.3474248	649.2468472
F4	DE	1032.728275	1054.795493	938.4181034	806.9647134	964.1899413	834.1049352	890.0596041	860.6923562	1019.947625
F5	DE	8247.095502	7180.745268	900.0000002	900	2971.88257	1150.275062	3214.707973	1554.72639	3902.158652
F6	DE	1380761004	1764417266	116425.1395	1800.448169	4389.133011	4820.470649	2864.001509	3252.961375	4918046.357
F7	DE	2199.471442	2230.440105	2044.358802	2021.016909	2394.92389	2052.434938	2057.304767	2083.138664	2196.105938
F8	DE	2458.782645	2343.310175	2230.956035	2220.687733	2534.230871	2224.367719	2346.900094	2241.980478	2268.906504

### baseCSA and modifiedCSA comparison with other CSA Variants

Function	BestAlgorithm	BaseCSA_Mean	ModCSA_Mean	CSA_ADAPTIVE_Mean	CSA_CHAOTIC_Mean	CSA_LF_Mean	CSA_OB_Mean	CSA_PSO_Mean
F1	CSA_CHAOTIC	69824.50234	59714.32473	11004.27493	300.0041719	301.9433098	307.4010358	43971.7424
F2	CSA_CHAOTIC	6395.218634	3909.893954	521.0626903	400.0106109	530.7020085	468.3472421	1444.783443
F3	CSA_LF	678.5029547	677.1851957	648.2684706	656.4397052	645.2263162	655.1338305	690.8567295
F4	CSA_ADAPTIVE	1053.154382	1059.644127	929.3441931	1084.553921	960.2979778	934.0769941	1020.817264
F5	CSA_OB	7981.290183	7522.835696	6438.231937	4325.89669	5095.738709	3769.029285	8026.302796
F6	CSA_LF	1799578301	2172419058	6577.392558	9827.064431	4942.815225	44930.37541	292168790.7
F7	CSA_LF	2210.350169	2248.753808	2219.801585	2319.390311	2128.58275	2244.593923	2213.401022
F8	CSA_OB	2460.20785	2462.998273	2378.65099	2711.749673	2464.008673	2354.315638	2401.952129