

## Pro 2D

	DErand/1/bin	DE best/1/bin	PSO	SOMA AtO	SOMA AtA
ackley	4.1357979263 52325e-09	9.0704981535 71249	1.3348190159 677669	- 3.3495832744 509753e+46	- 1.93853512790 44325e+126
ackley_n4	- 4.1688956370 68437	- 5.7985495231 25531	- 5.9950092855 6756	- 3.3442780529 541315e+44	- 3.19782592186 4715e+119
alpine_n1					
alpine_n2	0.0004817644 7646607626	nan	0.0068855699 596603636	- 2.0459287964 896196e+44	- 9.95617676304 6453e+127
griewank	0.1473825891 0106491	0.1804258808 1315467	0.0	- 4.5970357894 35528e+44	- 9.73543857744 331e+130
happy_cat	1.4802973661 668753e-16	3.3065093906 464385	0.0199061610 23338267	- 4.2668971784 03448e+45	- 3.98128950509 24695e+125
katsuura	0.0965665310 5950964	8.3966796766 71993e+88	0.1154686210 6262518	- 1.6046746947 831853e+46	- 3.53856978065 74024e+136
langermann	6.7265611432 62288e+95	- 2.9911745108 11384	2.1776354887 35703e+87	- 4.2011768726 61297e+43	- 1.43071955364 6343e+130
levy	- 3.8619422291 78118	7.7067754160 95494	- 5.1620766158 84513	- 1.4864827231 057302e+45	- 5.94647755086 713e+131
michalewicz	1.5681423081 491746e-18	- 1.8230419719 434685	3.5594309626 091e-08	- 6.6932990731 61298e+45	- 9.02725332464 4856e+128
perm	- 1.2512399820 608744	-inf	- 1.9040312936 162418	- 8.9475213871 87087e+43	- 8.24078598647 0793e+131
quartic	1.2901698951 296008	0.6472409371 065163	0.0	- 3.6336917015 54628e+44	- 3.69379007545 0372e+131
rastrigin	0.5704010590 180103	3.0028698460 96983	0.0061189068 541835975	- 1.4325006379 307065e+45	- 4.61099929470 1414e+127
rosenbrock	0.1989918114 644772	8.7605167705 16599	0.1833770933 0155635	- 2.6290694544 98285e+44	- 2.49303945617 29528e+126
salomon	1.7861805370 108848e-08	0.4267659733 733291	9.8586024589 04313	- 2.2695176213 03924e+45	- 8.57122814613 7288e+136
shubert	0.0771209857 5200572	- 13.616223748 303062	0.0522805797 926724	- 5.1719396479 08845e+44	- 1.82642513928 5235e+123

shubert_3	- 14.518558707 2075	- 23.180206819 37957	- 17.809228340 90046	- 5.1245355391 25834e+45	- 8.24078598647 0793e+131
shubert_4	- 21.162617012 21902	- 20.391098426 654537	- 29.381872294 26565	- 1.5066360391 717035e+44	- 3.37042605910 1208e+128
schubert_cubic	- 18.516039581 72849	- 6.3759221428 66944	- 29.381872294 26565	- 2.9534797087 81168e+45	- 3.87995520679 34017e+124
schwefel	- 2.7666284275 92663	729.58534975 36223	- 24.926556104 57543	- 1.8719588138 628175e+45	- 1.10883648396 73552e+127
sinusoidal	834.05401089 91128	- 4.1316566104 649555	- 7.5249344588 691445	- 1.2129453651 503832e+46	- 1.06857608015 5838e+137
styblinski	- 4.3129542543 34104	- 68.261830801 67421	- 237511.13107 386619	- 4.1557809934 54333e+132	- 8.24086097701 2335e+136
xin_she_yang_n2	- 61.839492517 640686	4.6203249062 94768	- 4.4489304442 55496	- 3.0993827027 374336e+45	- 2.46252425568 58003e+127
xin_she_yang	,	37.049708539 6667	- 78.332325442 29963	- 2.9326142387 109267e+46	- 9.95647291474 5833e+125
xin_she_yang_n4	- 12.670832024 704806	- 11.702009153 527488	0.3809071451 476221	- 6.1383885223 14594e+45	- 2.89409971175 87456e+128

	DErand/1/bin	DE best/1/bin	PSO	SOMA AtO	SOMA AtA
ackley	0.0481705861 4406102	14.420333164 884577	20.410943370 921736	- 1.5009227690 805983e+99	- 1.79756837892 96528e+308
ackley_n4	18.818313470 670933	- 39.538319318 89821	- 35.114616636 38884	- 1.12574777492 059891e+98	- 1.79756837892 96528e+308
alpine_n1	0.0317510347 7196504	0.3666290061 3167587	5.4951199001 12565	- 7.6645964081 74589e+98	- 1.79756837892 96528e+308
alpine_n2	1.7477737759 041092e-07	0.0	0.0	- 3.8321821729 884323e+99	- 1.79756837892 96528e+308
griewank	0.0001149457 062751084	0.1140834429 8366922	0.0999217706 6194531	- 1.4867398647 32354e+99	- 1.79756837892 96528e+308
happy_cat	1.9081578063 547597	0.7903385367 090794	5.1669561966 52782e+89	- 4.5221173595 58261e+98	- 1.79756837892 96528e+308
katsuura	6.1216556460 4068e+98	3.7758379915 272816e+94	12.497871222 999997	- 9.4474991083 93978e+97	- 1.79756837892 96528e+308
langermann	0.0007296242 085217216	51.820500317 277684	- 5.6369560980 05839	- 9.8307337826 90369e+97	- 1.79756837892 96528e+308
levy	- 0.6363488324 646245	- 7.2441573331 5328	0.0	- 4.4329227281 85808e+99	- 1.79756837892 96528e+308
michalewicz	- 38.179494514 75093	0.0	0.0294003431 56925638	- 3.0666194978 8046e+99	- 1.79756837892 96528e+308
perm	0.8904380108 567049	3.5773708657 75667	17.908957978 03423	- 1.0494289310 069594e+99	- 1.79756837892 96528e+308
quartic	106.23568890 941434	45.470500665 553416	117.95581940 77949	- 5.4936962019 430554e+97	- 1.79756837892 96528e+308
rastrigin	8.1134601975 85631	51.003439112 27633	0.2167692693 314781	- 2.2126008557 56762e+98	- 1.79756837892 96528e+308
rosenbrock	1.3019462253 396854	0.8798733458 656668	- 40294.673777 75508	- 1.3789349131 684782e+99	- 1.79756837892 96528e+308
salomon	- 463.81117990 675386	- 670865.49773 25712	- 91.659144074 73527	- 3.4126676878 357245e+98	- 1.79756837892 96528e+308

shubert	- 21.349604273 338226	- 112.15516185 638126	- 80.269107373 4165	- 6.4379806016 72711e+99	- 1.79756837892 96528e+308
shubert_ 3	- 24.383574055 319205	- 97.823722879 44642	- 24.664972549 81952	- 6.0831605320 36666e+97	- 1.79756837892 96528e+308
shubert_ 4	- 9.7598325681 27246	- 28.420973599 473633	- 4.2672011717 62935e+17	- 3.8053060565 70645e+98	- 1.79756837892 96528e+308
schubert_ cubic	4164.9703933 39089	3763.7960187 38629	- 17.471167807 44405	- 1.5773491583 4508e+97	- 1.79756837892 96528e+308
schwefel	- 3.5886438923 040376	- 19.854431686 108903	- 358.58538186 928996	- 1.1000853909 125082e+98	- 1.79756837892 96528e+308
sinusoidal	- 239.71216654 763958	- 318.60265892 946194	- 361.93106671 580597	- 5.2194175414 84116e+99	- 1.79756837892 96528e+308
styblinski	- 249.19068878 049046	- 314.46460289 809977	826661.44297 37035	- 7.3694720153 79917e+96	- 1.79756837892 96528e+308
xin_she_y ang_n2	0.1895623993 5021907	75631.066704 7522	0.1924353825 3371886	- 2.9728306455 02501e+98	- 1.79756837892 96528e+308
xin_she_y ang	0.6748685814 106353	3.3299144944 277814	- 170065.05650 14075	- 1.1183384439 750893e+97	- 1.79756837892 96528e+308
xin_she_y ang_n4	- 59577.498318 35195	- 105606.23532 705009	0.2167692693 314781	- 5.5559864897 00425e+98	- 1.79756837892 96528e+308

## Pro 30D

	DErand/1/bin	DE best/1/bin	PSO	SOMA AtO	SOMA AtA
ackley	3.8141957074 979778	9.0704981535 71249	20.874615934 93159	- 9.34525594881 3399e+154	- 1.79768611518 69759e+308
ackley_n 4	107.40623310 411232	- 5.7985495231 25531	- 85.790349796 43397	- 9.16012598962 9986e+153	- 1.79768611518 69759e+308
alpine_n1	7.2134995457 16841	0.0911311868 9189928	55.350298407 93455	- 2.89917500037 65716e+154	- 1.79768611518 69759e+308
alpine_n2	0.0	0.0	0.0	- 1.77410248995 36952e+154	- 1.79768611518 69759e+308
griewank	0.2914882751 958441	0.1804258808 1315467	0.0236079292 32490672	- 5.44889694340 5422e+154	- 1.79768611518 69759e+308
happy_cat	3.8354460680 41817	3.3065093906 464385	0.6474859327 388219	- 2.47913147059 02617e+154	- 1.79768611518 69759e+308
katsuura	7.2365260704 79323e+101	8.3966796766 71993e+88	4.2283218524 313605e+75	- 3.62270975893 448e+154	- 1.79768611518 69759e+308
langermann	2.5348312143 12951	- 2.9911745108 11384	285.88393109 432997	- 1.93527033109 40304e+154	- 1.79768611518 69759e+308
levy	0.1531146311 976275	7.7067754160 95494	- 10.316972131 066084	- 1.55505086282 65163e+154	- 1.79768611518 69759e+308
michalewicz	- 5269551.0787 66112	- 1.8230419719 434685	0.0	- 2.56038683345 33403e+154	- 1.79768611518 69759e+308
perm	115.93702998 218306	-inf	2.1686418021 887937	- 3.25746420859 38214e+154	- 1.79768611518 69759e+308
quartic	374.91332846 965753	0.6472409371 065163	106.68906185 781869	- 5.85940992298 4995e+153	- 1.79768611518 69759e+308
rastrigin	1005.0418333 061774	3.0028698460 96983	2687.2142275 54409	- 6.11661110683 1896e+154	- 1.79768611518 69759e+308
rosenbrock	1.3768817194 70522	8.7605167705 16599	0.7594913449 51066	- 5.24252920649 9558e+153	- 1.79768611518 69759e+308
salomon	- 0.0235393790 4686696	0.4267659733 733291	- 6748445176.7 7815	- 1.75719453218 93475e+153	- 1.79768611518 69759e+308

shubert	- 2.7644649860 85497	- 13.616223748 303062	- 169.59826710 56585	- 8.17406790076 1662e+154	- 1.79768611518 69759e+308
shubert_ 3	- 4.7074273713 78498	- 23.180206819 37957	- 164.63638874 006364	- 1.72956978206 9264e+154	- 1.79768611518 69759e+308
shubert_ 4	- 2.8440742232 40497	- 20.391098426 654537	- 46.206437963 62399	- 6.76219222852 6931e+154	- 1.79768611518 69759e+308
schubert _cubic	12462.811538 509666	- 6.3759221428 66944	- 7.6771265370 70618e+39	- 6.98340248002 4415e+153	- 1.79768611518 69759e+308
schwefel	- 0.5615545884 794615	729.58534975 36223	- 39.883819167 77045	- 1.71846005617 2103e+154	- 1.79768611518 69759e+308
sinusoida l	1366.0313671 80142	- 4.1316566104 649555	- 1022.8443027 375023	- 4.16493394375 15066e+153	- 1.79768611518 69759e+308
styblinski	1437.5478517 274025	- 68.261830801 67421	- 1022.1518255 155091	- 1.73326779724 46194e+154	- 1.79768611518 69759e+308
xin_she_ yang_n2	473547.80537 07847	4.6203249062 94768	4.2162174423 51359e+25	- 1.27688874268 17695e+155	- 1.79768611518 69759e+308
xin_she_ yang	1.9642780124 126604	37.049708539 6667	0.0009713387 434615203	- 2.90384338209 12933e+154	- 1.79768611518 69759e+308
xin_she_ yang_n4	- 60818715060. 237076	- 11.702009153 527488	- 988569867753 66.28	- 3.13731226359 50293e+154	- 1.79768611518 69759e+308