**Max generation:** 300

**Population size:** 400

**N:** 10

**Mutation case:** Case2

**Survivor selection type:** Generational

Results of x\_over methods:

(The green color shows the value in this dimension is approximately zero)

(f\_array is function values in different dimensions)

* **XOVER\_METHOD = LOCAL\_DISC**

fitness = 0.00012727566263492918 (the result rounded)

x = [420.9687468, 420.9687467, 420.9687462,

420.968746, 420.9687451, 420.9687469,

420.9687472, 420.9687453, 420.9687467,

420.968745]

f\_array = [1.2727566286230285e-05, 1.2727566286230285e-05,

1.2727566229386866e-05, 1.2727566229386866e-05,

1.272756651360396e-05, 1.2727566343073704e05,

1.2727566343073704e-05, 1.2727566399917123e-05,

1.2727566286230285e-05, 1.272756651360396e-05]

* **XOVER\_METHOD = LOCAL\_INT**

fitness = 1362.1149460891397

x = [420.9687465, 203.8142529, 65.5478653,

65.5478648, 203.8142533, 420.9687462,

203.8142524, 420.9687466, 420.9687466,

420.9687463]

f\_array: [1.2727566229386866e-05, 217.13968211813918,

355.34791804844554, 355.34791804844554,

217.13968211813923, 1.2727566229386866e-05,

217.13968211813915, 1.2727566286230285e-05,

1.2727566286230285e-05, 1.2727566229386866e-05]

* **XOVER\_METHOD = GLOBAL\_DISC**

fitness = 0.00012727566263492918

x = [420.9687471, 420.9687455, 420.9687457,

420.9687475, 420.9687471, 420.9687469,

420.9687465, 420.9687475, 420.9687467,

420.9687475]

f\_array: [1.2727566343073704e-05, 1.2727566343073704e-05,

1.2727566343073704e-05, 1.2727566399917123e-05, 1.2727566343073704e-05, 1.2727566343073704e-05, 1.2727566229386866e-05, 1.2727566399917123e-05, 1.2727566286230285e-05, 1.2727566399917123e-05]

* **XOVER\_METHOD = GLOBAL\_INT**

fitness = 868.5588048379536

x = [203.8142527, 203.8142524, 203.814253,

420.968746, 203.8142524, 420.968746,

420.9687462, 420.9687469, 420.9687465,

420.9687462]

f\_array: [217.13968211813918, 217.13968211813915,

217.1396821181392, 1.2727566229386866e-05, 217.13968211813915, 1.2727566229386866e-05, 1.2727566229386866e-05, 1.2727566343073704e-05, 1.2727566229386866e-05, 1.2727566229386866e-05]

**Max generation:** 200

**Population size:** 400

**N:** 10

**Xover method:** LOCAL\_DISC

**Survivor selection type:** Generational

Results of mutation methods:

* **MUTATION\_MODE = CASE1**

fitness = 355.34803259654154

x = [420.9687455, 420.9687462, 420.9687467,

420.9687468, 420.9687466, 65.547864,

420.9687469, 420.9687472, 420.9687462,

420.968746]

f\_array: [1.2727566343073704e-05, 1.2727566229386866e-05,

1.2727566286230285e-05, 1.2727566286230285e-05, 1.2727566286230285e-05, 355.34791804844565, 1.2727566343073704e-05, 1.2727566343073704e-05, 1.2727566229386866e-05, 1.2727566229386866e-05]

* **MUTATION\_MODE = CASE2**

fitness = 0.00012727566263492918 (the result rounded)

x = [420.9687468, 420.9687467, 420.9687462,

420.968746, 420.9687451, 420.9687469,

420.9687472, 420.9687453, 420.9687467,

420.968745]

f\_array = [1.2727566286230285e-05, 1.2727566286230285e-05,

1.2727566229386866e-05, 1.2727566229386866e-05,

1.272756651360396e-05, 1.2727566343073704e05,

1.2727566343073704e-05, 1.2727566399917123e-05,

1.2727566286230285e-05, 1.272756651360396e-05]

For 10 time running with mutation Case 1 and observe count non zero dimensions every time:

1 time non zero appears in two dimensions

3 time non zero appears in no dimensions

7 time non zero appears in one dimension

For 10 time of Case2:

0 time non zero appears in two dimensions

7 time non zero appears in no dimensions

3 time non zero appears in one dimension

Compare X-over methods:

**LOCAL\_DISC:** 10/10 of dimensions get approximate zero

**LOCAL\_INT:** 5/10 of dimensions get approximate zero

**GLOBAL\_DISC:** 10/10 of dimensions get approximate zero

**GLOBAL\_INT:** 6/10 of dimensions get approximate zero

(The orange color show that this method got better value in compare with other)

**GLOBAL\_DISC**

f\_array: [1.2727566286230285e-05, 1.2727566229386866e-05, 1.2727566456760542e-05, 1.2727566286230285e-05, 1.2727566286230285e-05, 1.2727566229386866e-05, 1.2727566286230285e-05, 1.2727566229386866e-05, 1.2727566343073704e-05, 1.2727566172543447e-05]

**LOCAL\_DISC**

f\_array: [1.2727566343073704e-05, 1.2727566343073704e-05, 1.2727566343073704e-05, 1.2727566229386866e-05, 1.2727566343073704e-05, 1.2727566286230285e-05, 1.2727566229386866e-05, 1.2727566343073704e-05, 1.2727566286230285e-05, 1.2727566172543447e-05]

for comparing **GLOBAL\_DISC** and **LOCAL\_DISC** as we look at their f\_array(function values in dimensions):

in **6** of dimensions **GLOBAL\_DISC** got **better** value.

In **3** of dimensions **LOCAL\_DISC** got **better** value.

and in **1** dimension they **got the same** value.

N = 10

MUTATION\_MODE = CASE2

SURVIVOR\_SEL\_TYPE = ELITISM

MAX\_GENERATION = 100

POPULATION\_SIZE = 230

|  |  |  |
| --- | --- | --- |
| Method | Average | Variance |
| Local discrete | 0.00012737701308651594 | 9.244888553759825e-14 |
| Local intermediate | 1866.6029470113158 | 64961.65432605778 |
| Global discrete | 0.00012727629728033208 | 1.5335412065158655e-18 |
| Global intermediate | 1598.9405378467602 | 94689.27574590142 |

MAX\_GENERATION = 100

POPULATION\_SIZE = 230

N = 10

XOVER\_METHOD = LOCAL\_DISC

SURVIVOR\_SEL\_TYPE = ELITISM

|  |  |  |
| --- | --- | --- |
| Method | Average | Variance |
| Case 1 | 410.6000360187283 | 41602.31382611238 |
| Case2 | 0.00012737701308651594 | 9.244888553759825e-14 |

MAX\_GENERATION = 100

POPULATION\_SIZE = 230

N = 10

XOVER\_METHOD = LOCAL\_DISC

MUTATION\_MODE = CASE2

average:

variance:

|  |  |  |
| --- | --- | --- |
| Method | Average | Variance |
| generational | 71.06414338643144 | 14588.985352483107 |
| Elitism | 0.00012737701308651594 | 9.244888553759825e-14 |