

#1294: OptiStruct – Global Search Option

Product: OptiStruct

Product Version: OptiStruct 12.0 or above

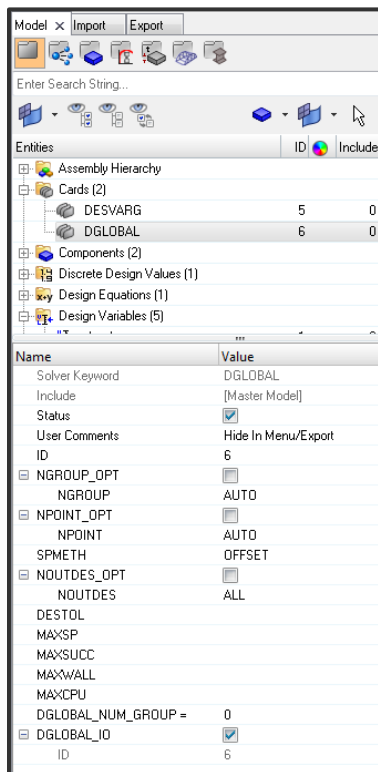
Topic Objective

Global Search Option in OptiStruct.

Topic Details

Global Search Option allows users to explore the design space in order to find multiple optima and hopefully, the global optimum.

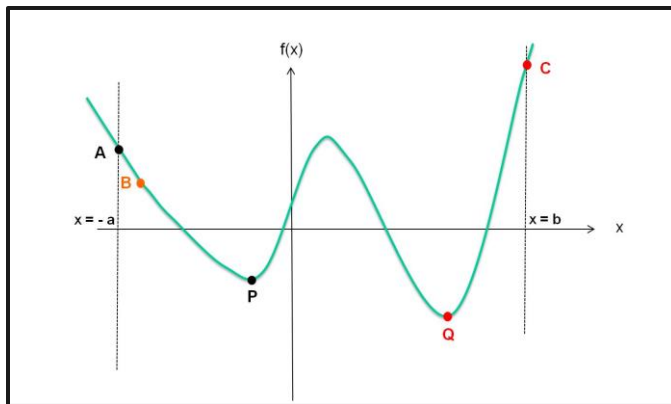
A global search algorithm to run an optimization of user-defined design variables from multiple starting points can be activated by `DGLOBAL=n` command in the I/O section. An additional `DGLOBAL` card in the bulk section with ID *n* defines required input parameters for the global search option. In HyperMesh, both cards are represented as one control card. In general, it is recommended to run the global search option with the default parameters, except for the termination criteria (number of groups and starting points), please see [manual](#).



Strategies for using GSO include:

- Grouping design variables together so that large problems can be handled with a reasonable number of starting points.
- Identifying starting points which have a greater chance of resulting in new optima.
- Deciding when to stop evaluating new starting points.

Best N designs are retained and presented along with a complete history of the search. Available for user-defined design variables.



For GSO, OptiStruct creates automatically

- summary at the end of the out file
- one directory for each design
- .slk result file (Microsoft SLK Data Import format) to import e.g. In Excel

- 📁 [rib_opt_global_opti_GSO_GSO_1_12]
- 📁 [rib_opt_global_opti_GSO_GSO_11_1]
- 📁 [rib_opt_global_opti_GSO_GSO_12_13]
- 📁 [rib_opt_global_opti_GSO_GSO_14_9]
- 📁 [rib_opt_global_opti_GSO_GSO_15_7]
- 📁 [rib_opt_global_opti_GSO_GSO_16_16]
- 📁 [rib_opt_global_opti_GSO_GSO_17_14]
- 📁 [rib_opt_global_opti_GSO_GSO_18_6]
- 📁 [rib_opt_global_opti_GSO_GSO_19_11]
- 📁 [rib_opt_global_opti_GSO_GSO_2_18]
- 📁 [rib_opt_global_opti_GSO_GSO_20_8]
- 📁 [rib_opt_global_opti_GSO_GSO_3_10]
- 📁 [rib_opt_global_opti_GSO_GSO_4_15]
- 📁 [rib_opt_global_opti_GSO_GSO_5_17]
- 📁 [rib_opt_global_opti_GSO_GSO_6_3]
- 📁 [rib_opt_global_opti_GSO_GSO_7_4]
- 📁 [rib_opt_global_opti_GSO_GSO_8_5]
- 📁 [rib_opt_global_opti_GSO_GSO_9_2]

THERE WERE 20 STARTING POINTS AND 18 UNIQUE DESIGNS WERE FOUND. THE BEST DESIGN WAS FOUND AT STARTING POINT 11.

GSO - TABLE OF UNIQUE DESIGNS				
Starting Point	Objective Function	Constraint Violation	Times Found	Directory Suffix
11	3.99964E-02	4.37314E-02	2	_GSO_11_1
9	4.05818E-02	0.00000E+00	1	_GSO_9_2
6	4.07076E-02	0.00000E+00	1	_GSO_6_3
7	4.07459E-02	0.00000E+00	1	_GSO_7_4
8	4.07885E-02	0.00000E+00	1	_GSO_8_5
18	4.08508E-02	0.00000E+00	1	_GSO_18_6
15	4.08921E-02	6.93854E-03	1	_GSO_15_7
20	4.09475E-02	0.00000E+00	1	_GSO_20_8
14	4.10163E-02	0.00000E+00	1	_GSO_14_9
3	4.10180E-02	0.00000E+00	1	_GSO_3_10
13	4.10846E-02	0.00000E+00	1	_GSO_13_11
1	4.10702E-02	0.00000E+00	1	_GSO_1_12
12	4.10932E-02	0.00000E+00	1	_GSO_12_13
17	4.11262E-02	4.43037E-03	1	_GSO_17_14
4	4.11417E-02	2.29313E-02	1	_GSO_4_15
16	4.11781E-02	1.07932E-02	1	_GSO_16_16
5	4.13178E-02	0.00000E+00	1	_GSO_5_17
2	5.11399E-02	0.00000E+00	2	_GSO_2_18

GSO - TABLE OF DESIGNS				
Starting Point	Objective Function	Constraint Violation	Unique Design	Directory Suffix
11	3.99964E-02	4.37314E-02	1	_GSO_11_1
13	4.00613E-02	2.22294E-02	1	_GSO_9_2
9	4.05818E-02	0.00000E+00	2	_GSO_6_3
6	4.07076E-02	0.00000E+00	3	_GSO_7_4
7	4.07459E-02	0.00000E+00	4	_GSO_8_5
8	4.07885E-02	0.00000E+00	5	_GSO_18_6
18	4.08508E-02	0.00000E+00	6	_GSO_15_7
15	4.08921E-02	6.93854E-03	7	_GSO_20_8
20	4.09475E-02	0.00000E+00	8	_GSO_14_9
14	4.10163E-02	0.00000E+00	9	_GSO_3_10
3	4.10180E-02	0.00000E+00	10	_GSO_13_11
13	4.10846E-02	0.00000E+00	11	_GSO_1_12
1	4.10702E-02	0.00000E+00	12	_GSO_12_13
12	4.10932E-02	0.00000E+00	13	_GSO_17_14
17	4.11262E-02	4.43037E-03	14	_GSO_4_15
4	4.11417E-02	2.29313E-02	15	_GSO_16_16
16	4.11781E-02	1.07932E-02	16	_GSO_5_17
5	4.13178E-02	0.00000E+00	17	_GSO_2_18
2	5.11399E-02	0.00000E+00	18	_GSO_2_18
10	5.11399E-02	0.00000E+00	18	_GSO_2_18