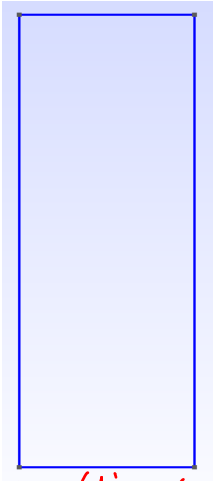
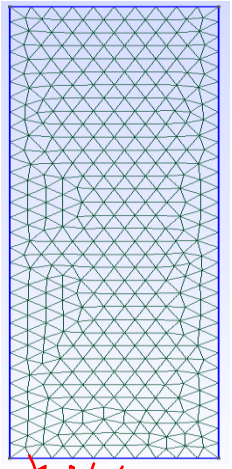
Mesh File Formats

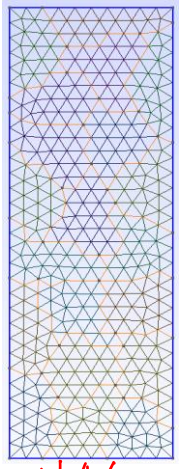
Geometry



2D Mesh

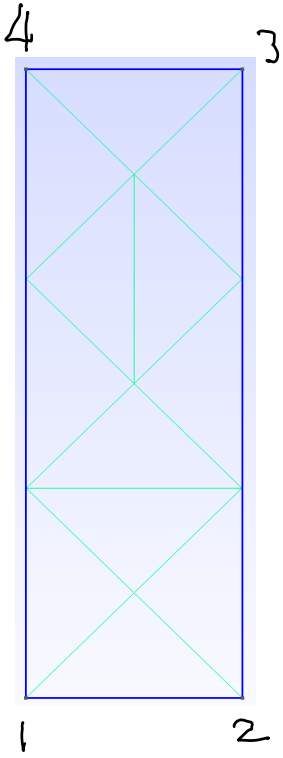


Partitioned Mesh



用Gmsh工具

An Example



Gmsh.geo 文件描述了何形状

lc = 1e-1; 修改此参数使离散化时mesh的大小变化。

This variable can then be used in the definition of Gmsh's simplest `elementary entity', a `Point'. A Point is uniquely identified by a tag (a strictly positive integer; here `1') and defined by a list of four numbers: three coordinates (X, Y and Z), and a characteristic length (lc) that sets the target element size at the point:

Point(1) = {0, 0, 0, lc}; 第一个结点

The distribution of the mesh element sizes will then be obtained by interpolation of these characteristic lengths throughout the geometry. Another method to specify characteristic lengths is to use general mesh size Fields (see `t10.geo'). A particular case is the use of a background mesh (see `t7.geo').

If no target mesh size of provided, a default uniform coarse size will be used for the model, based on the overall model size.

We can then define some additional points. All points should have different tags:

Point(2) = {.1, 0, 0, lc};
Point(3) = {.1, .3, 0, lc};
Point(4) = {0, .3, 0, lc};

} 2,3,4结点.

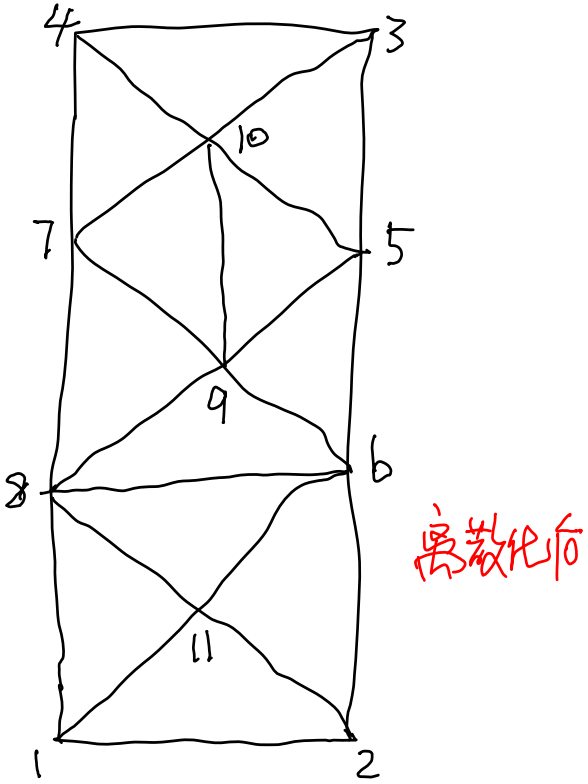
DAT format

(----Tochnog Input File Created by Gmsh Version 2.13.1 ----)

(**EDIT OR MODIFY THE ENTRIES BELOW AS REQUIRED**)
echo -yes
number of space dimensions (add number here)
derivatives
materi_velocity
materi_displacement
materi_strain_total
materi_stress
condif_temperature
number_of_integration_points (add number here)
end_initia
options_element_dof -yes

(----------Nodes----------)

node 1 0 0
node 2 0.1 0
node 3 0.1 0.3
node 4 0 0.3
node 5 0.1 0.2000000000002564
node 6 0.1 0.1000000000002544
node 7 0 0.2000000000002564



node 8 0 0.1000000000002544
node 9 0.04999999999999999 0.1500000000002553
node 10 0.05 0.2500000000001282
node 11 0.05 0.05000000000012718

(+++++++++++++++ E L E M E N T S +++++++++++++++)

element 8 -tria3 3 4 10
element 9 -tria3 2 6 11
element 10 -tria3 8 1 11
element 11 -tria3 6 5 9
element 12 -tria3 7 8 9
element 13 -tria3 7 9 10
element 14 -tria3 9 5 10
element 15 -tria3 8 6 9
element 16 -tria3 1 2 11
element 17 -tria3 5 3 10
element 18 -tria3 4 7 10
element 19 -tria3 6 8 11

(+------------+---------Physical Groups Section----------+------------+

- In Tochnog use Physical Groups to define 'element_group' entities to -
- identify materials, and groups of nodes to apply boundary conditions -)

(- For example, groups of ELEMENTS chosen using gmsh 'physical groups' can be used as follows)

(- element_group -ra INSERT HERE GROUP OF ELEMENTS SAVED WITH GMSH -ra Material number)

(- For example, groups of nodes chosen using gmsh 'physical groups' can be used as follows)
(- bounda_unknown 0 -ra INSERT HERE GROUP OF NODES SAVED WITH GMSH -ra -velx -vely)
(- bounda_time 0 0.000 0.000 1000000.000 0.000)

(+------------+---------Physical Groups Section----------+------------+

(Element sets ===> 'element_group' to identify DIFFERENT MATERIALS =PhysicalLine5)
1 2 3 4 5 6 7

(Element sets ===> 'element_group' to identify DIFFERENT MATERIALS =My_surface)
8 9 10 11 12 13 14 15 16 17
18 19

(Node sets ===> Used to set BOUNDARY CONDITIONS in Tochnog =PhysicalLine5)

1 2 3 4 5 6 7 8

(Node sets ===> Used to set BOUNDARY CONDITIONS in Tochnog =My_surface)

1 2 3 4 5 6 7 8 9 10
11

M Format

```
%  Matlab mesh
% t1, Created by Gmsh
% ASCII
clear msh;
msh.nbNod = 11;
msh.POS = [
0 0 0;
0.1 0 0;
0.1 0.3 0;
0 0.3 0;
0.1 0.2000000000002564 0;
0.1 0.1000000000002544 0;
0 0.2000000000002564 0;
0 0.1000000000002544 0;
0.04999999999999999 0.1500000000002553 0;
0.05 0.2500000000001282 0;
0.05 0.05000000000012718 0;
];
msh.MAX = max(msh.POS);
msh.MIN = min(msh.POS);
msh.LINES =[
 1 2 0
 3 5 0
 5 6 0
```

```
 6 2 0
 3 4 0
 4 7 0
 7 8 0
 8 1 0
];
msh.TRIANGLES =[
 3 4 10 0
 2 6 11 0
 8 1 11 0
 6 5 9 0
 7 8 9 0
 7 9 10 0
 9 5 10 0
 8 6 9 0
 1 2 11 0
 5 3 10 0
 4 7 10 0
 6 8 11 0
];
msh.PNT =[
 1 0
 2 0
 3 0
 4 0
];
```

```
$MeshFormat
4.1 0 8
$EndMeshFormat
$PhysicalNames
1
2 6 "My surface"
$EndPhysicalNames
$Entities
4 4 1 0
1 0 0 0 0
2 0.1 0 0 0
3 0.1 0.3 0 0
4 0 0.3 0 0
1 0 0 0 0.1 0 0 1 5 2 1 -2
2 0.1 0 0 0.1 0.3 0 1 5 2 3 -2
3 0 0.3 0 0.1 0.3 0 0 2 3 -4
4 0 0 0 0 0.3 0 1 5 2 4 -1
1 0 0 0 0.1 0.3 0 1 6 4 4 1 -2 3
$EndEntities
$Nodes
9 11 1 11
0 1 0 1
1
0 0 0
```

0 2 0 1
2
0.1 0 0
0 3 0 1
3
0.1 0.3 0
0 4 0 1
4
0 0.3 0
1 1 1 0
1 2 1 2
5
6
0.1 0.2000000000002564 0 0.3333333333324788
0.1 0.1000000000002544 0 0.6666666666658188
1 3 1 0
1 4 1 2
7
8
0 0.2000000000002564 0 0.3333333333324788
0 0.1000000000002544 0 0.6666666666658188
2 1 1 3
9
10
11
0.04999999999999999 0.1500000000002553 0 0.1500000000002553 0.04999999999999999

0.05 0.2500000000001282 0 0.2500000000001282 0.05
0.05 0.05000000000012718 0 0.05000000000012718 0.05
$EndNodes
$Elements
9 24 1 24
0 1 15 1
20 1
0 2 15 1
21 2
0 3 15 1
22 3
0 4 15 1
23 4
1 1 1 1
1 1 2
1 2 1 3
2 3 5
3 5 6
4 6 2
1 3 1 1
24 3 4
1 4 1 3
5 4 7
6 7 8
7 8 1
2 1 2 12

8 3 4 10
9 2 6 11
10 8 1 11
11 6 5 9
12 7 8 9
13 7 9 10
14 9 5 10
15 8 6 9
16 1 2 11
17 5 3 10
18 4 7 10
19 6 8 11
$EndElements

Su2 Format

```
NDIME= 2
NELEM= 12
5 2 3 9 0
5 1 5 10 1
5 7 0 10 2
5 5 4 8 3
5 6 7 8 4
5 6 8 9 5
5 8 4 9 6
5 7 5 8 7
5 0 1 10 8
5 4 2 9 9
5 3 6 9 10
5 5 7 10 11
NPOIN= 11
0 0 0
0.1 0 1
0.1 0.3 2
0 0.3 3
0.1 0.2000000000002564 4
0.1 0.1000000000002544 5
0 0.2000000000002564 6
0 0.1000000000002544 7
0.04999999999999999 0.1500000000002553 8
```

0.05 0.2500000000001282 9
0.05 0.05000000000012718 10
NMARK= 1
MARKER_TAG= PhysicalLine5
MARKER_ELEMS= 7
3 0 1
3 2 4
3 4 5
3 5 1
3 3 6
3 6 7
3 7 0

Vtk Format

```
# vtk DataFile Version 2.0
t1, Created by Gmsh
ASCII
DATASET UNSTRUCTURED_GRID
POINTS 11 double
0 0 0
0.1 0 0
0.1 0.3 0
0 0.3 0
0.1 0.2000000000002564 0
0.1 0.1000000000002544 0
0 0.2000000000002564 0
0 0.1000000000002544 0
0.04999999999999999 0.1500000000002553 0
0.05 0.2500000000001282 0
0.05 0.05000000000012718 0

CELLS 24 80
1 0
1 1
1 2
1 3
2 0 1
2 2 4
```

2 4 5
2 5 1
2 2 3
2 3 6
2 6 7
2 7 0
3 2 3 9
3 1 5 10
3 7 0 10
3 5 4 8
3 6 7 8
3 6 8 9
3 8 4 9
3 7 5 8
3 0 1 10
3 4 2 9
3 3 6 9
3 5 7 10

CELL_TYPES 24
1
1
1
1
3
3

3
3
3
3
3
3
5
5
5
5
5
5
5
5
5
5
5
5

CELL_DATA 24
SCALARS CellEntityIds int 1
LOOKUP_TABLE default
-1
-1
-1
-1

5
5
5
5
-1
5
5
5
6
6
6
6
6
6
6
6
6
6
6
6