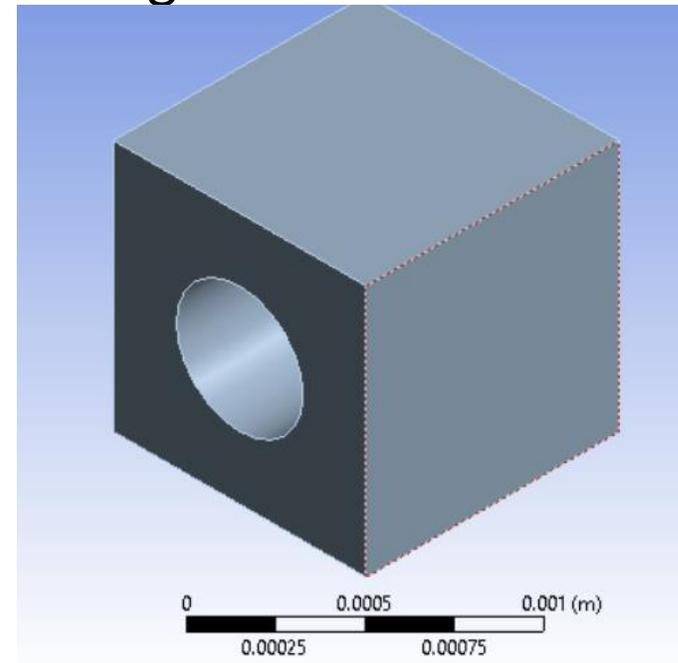
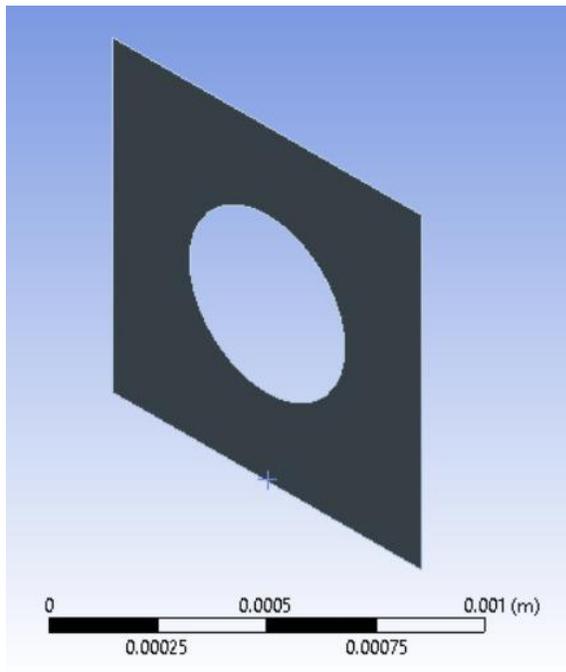
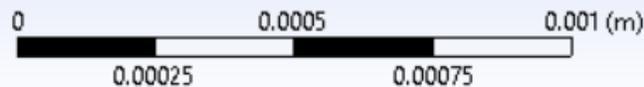
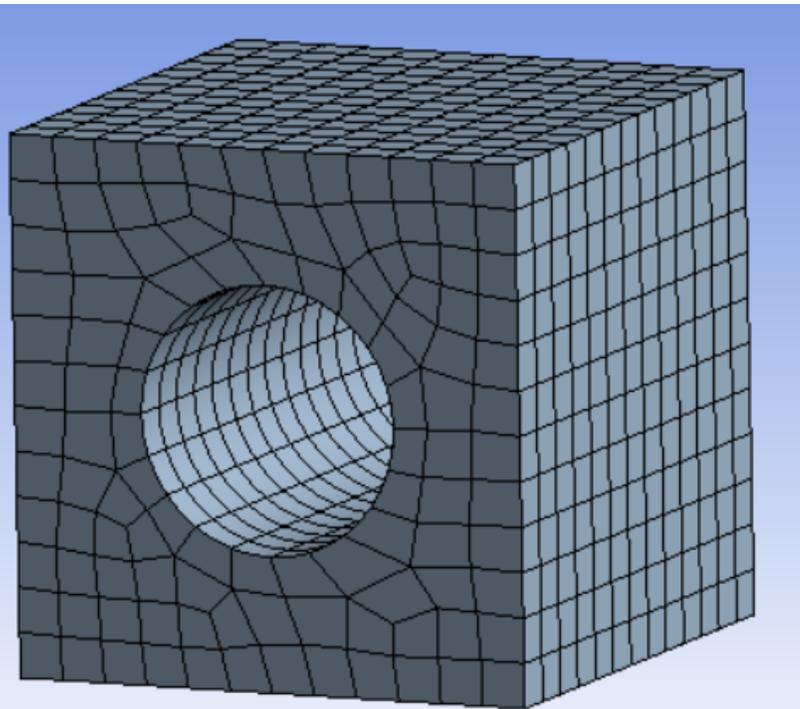


The implicit model which I want to achieve is the top model and the base geometies I tried to homogenize are given below



3D - Solid H – Periodic in 3 Direction – Quad Mesh



The Effective Stiffness Matrix

1.5401930E+011	5.3234373E+010	6.2176103E+010	2.7462405E-006	1.1702970E-006	7.0522778E+006
5.3234373E+010	1.5401730E+011	6.2175502E+010	2.3497059E-006	2.9712215E-006	3.8078847E+006
6.2176103E+010	6.2175502E+010	1.9803637E+011	2.2810502E-006	4.7213967E-006	3.2580488E+006
2.7462405E-006	2.3497059E-006	2.2810502E-006	5.1667434E+010	6.2498193E+005	2.4869290E-007
1.1702970E-006	2.9712215E-006	4.7213967E-006	6.2498193E+005	5.1667628E+010	6.4937272E-007
7.0522778E+006	3.8078847E+006	3.2580488E+006	2.4869290E-007	6.4937272E-007	3.8984576E+010

The Effective Compliance Matrix

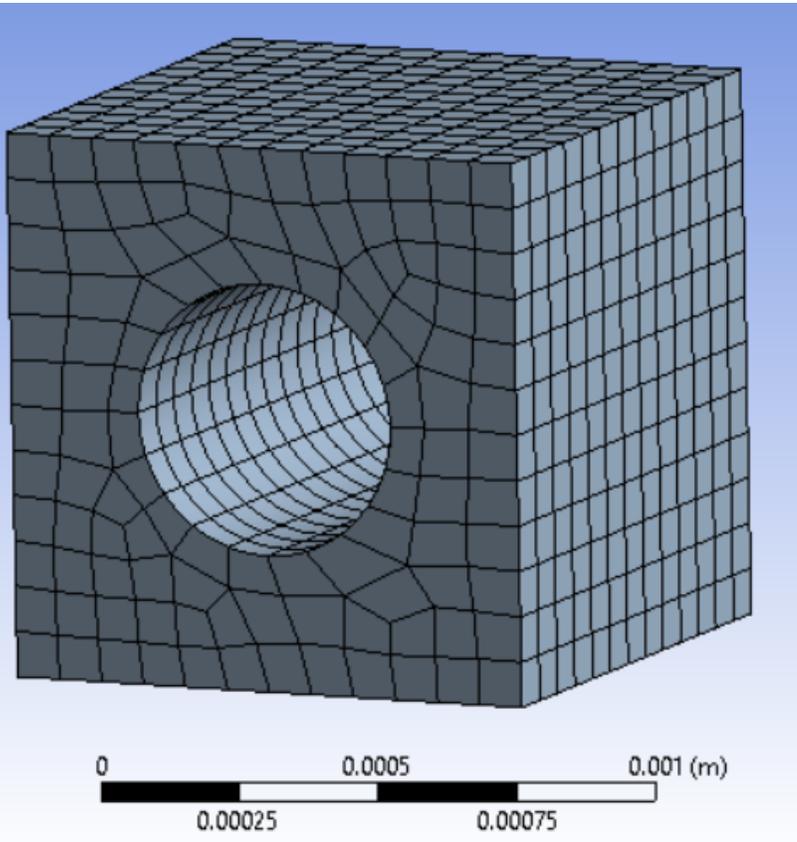
7.9335168E-012	-1.9886522E-012	-1.8664738E-012	-2.4883900E-028	1.0523763E-028	-1.0849353E-015
-1.9886522E-012	7.9336127E-012	-1.8664738E-012	-1.7269300E-028	-2.4062586E-028	-2.5919717E-016
-1.8664738E-012	-1.8664738E-012	6.2215794E-012	-9.0579742E-029	-4.1891707E-028	-3.7157627E-030
-2.4883900E-028	-1.7269300E-028	-9.0579742E-029	1.9354551E-011	-2.3411651E-016	-1.2339444E-028
1.0523763E-028	-2.4062586E-028	-4.1891707E-028	-2.3411651E-016	1.9354478E-011	-3.2234987E-028
-1.0849353E-015	-2.5919717E-016	-3.7157627E-030	-1.2339444E-028	-3.2234987E-028	2.5651171E-011

The Engineering Constants (Approximated as Orthotropic)

E1 =	1.2604751E+011
E2 =	1.2604598E+011
E3 =	1.6073089E+011
G12 =	3.8984576E+010
G13 =	5.1667628E+010
G23 =	5.1667434E+010
nu12 =	2.5066465E-001
nu13 =	2.3526437E-001
nu23 =	2.3526152E-001

Only this homogenization is successful

3D - Solid H – Aperiodic in Y Direction – Quad Mesh



The Effective Stiffness Matrix

1.5035227E+011	6.4436686E+010	6.4436686E+010	-4.3570036E-007	1.0902653E-006	-7.3380427E-007
6.4436686E+010	2.0424308E+011	8.0603929E+010	-2.7026016E-007	2.0757740E-006	-4.7557702E-007
6.4436686E+010	8.0603929E+010	2.0424308E+011	-2.4451688E-007	4.3740319E-006	6.3461380E-008
-4.3570036E-007	-2.7026016E-007	-2.4451688E-007	6.1819574E+010	-8.2439144E-009	-2.3732160E-009
1.0902653E-006	2.0757740E-006	4.3740319E-006	-8.2439144E-009	5.1667628E+010	-5.1317346E-008
-7.3380427E-007	-4.7557702E-007	6.3461380E-008	-2.3732160E-009	-5.1317346E-008	6.1819574E+010

The Effective Compliance Matrix

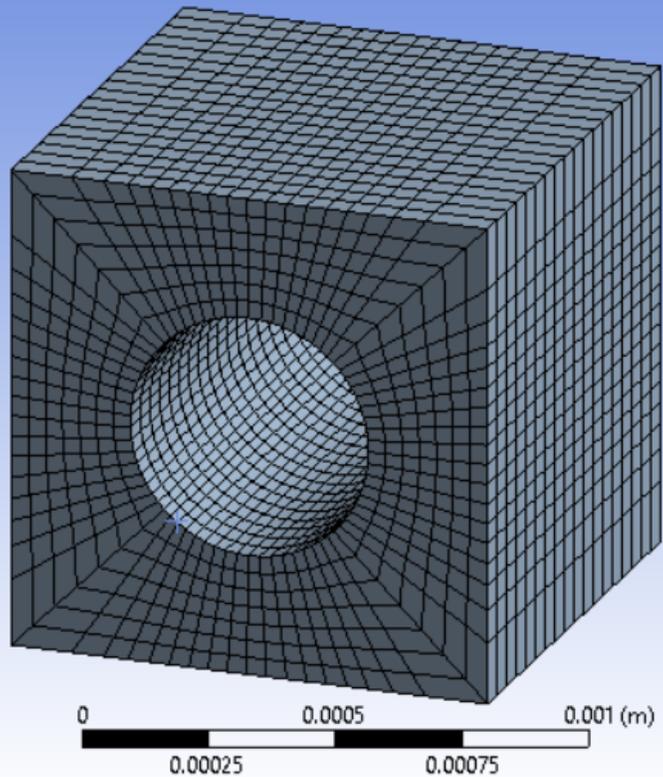
8.2508817E-012	-1.8664738E-012	-1.8664738E-012	4.2609388E-029	5.8890722E-029	8.5496047E-029
-1.8664738E-012	6.2215794E-012	-1.8664738E-012	6.6619251E-030	-5.2559513E-029	2.7623334E-029
-1.8664738E-012	-1.8664738E-012	6.2215794E-012	3.2938498E-030	-4.1232892E-028	-4.2900790E-029
4.2609388E-029	6.6619251E-030	3.2938498E-030	1.6176106E-011	2.5810056E-030	6.2099902E-031
5.8890722E-029	-5.2559513E-029	-4.1232892E-028	2.5810056E-030	1.9354479E-011	1.6066440E-029
8.5496047E-029	2.7623334E-029	-4.2900790E-029	6.2099902E-031	1.6066440E-029	1.6176106E-011

The Engineering Constants (Approximated as Orthotropic)

E1 =	1.2119917E+011
E2 =	1.6073089E+011
E3 =	1.6073089E+011
G12 =	6.1819574E+010
G13 =	5.1667628E+010
G23 =	6.1819574E+010
nu12 =	2.2621507E-001
nu13 =	2.2621507E-001
nu23 =	3.0000000E-001

I assigned these properties to an implicit model and compared it with full-scale model but there were a considerable difference in response. Thus I decided to use symmetrical mesh to successfully homogenize with finite size

3D - Solid H – Periodic in 3 Direction – Periodic Mesh



The Effective Stiffness Matrix

2.1636744E+011	9.2728903E+010	9.2728903E+010	-1.3495776E-006	-4.6737219E-007	3.7668571E-006
9.2728903E+010	2.1636744E+011	9.2728903E+010	-3.4736035E-006	-2.3484818E-007	8.1546667E-006
9.2728903E+010	9.2728903E+010	2.1636744E+011	-1.3112611E-006	-5.7170643E-007	4.2308525E-006
-1.3495776E-006	-3.4736035E-006	-1.3112611E-006	6.1819268E+010	5.7552080E-006	-1.5150604E-007
-4.6737219E-007	-2.3484818E-007	-5.7170643E-007	5.7552080E-006	6.1819268E+010	6.4268796E-008
3.7668571E-006	8.1546667E-006	4.2308525E-006	-1.5150604E-007	6.4268796E-008	6.1819268E+010

The Effective Compliance Matrix

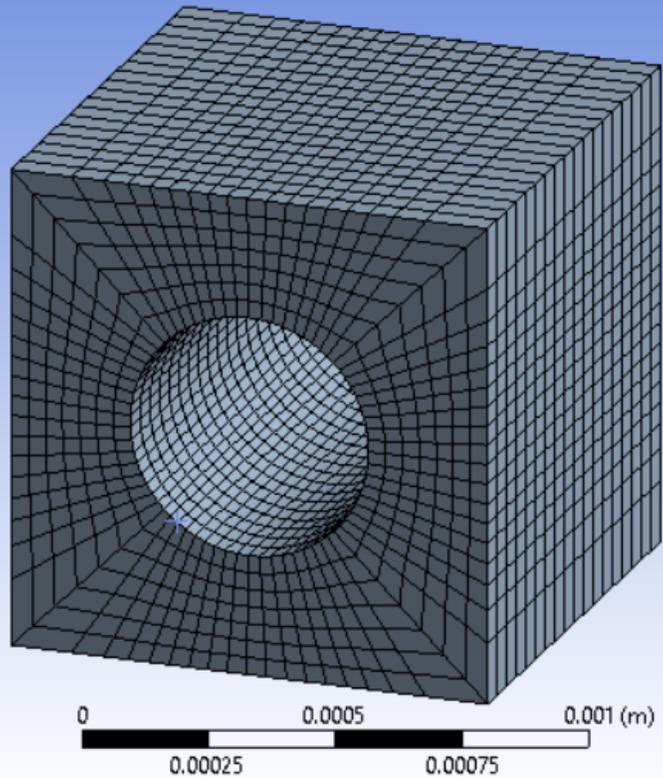
6.2216101E-012	-1.8664830E-012	-1.8664830E-012	-8.6433084E-030	2.2685274E-029	-5.1530046E-030
-1.8664830E-012	6.2216101E-012	-1.8664830E-012	2.6925256E-028	-7.7368882E-030	-5.7922988E-028
-1.8664830E-012	-1.8664830E-012	6.2216101E-012	-1.3656425E-029	3.6335792E-029	-6.5859603E-029
-8.6433084E-030	2.6925256E-028	-1.3656425E-029	1.6176186E-011	-1.5059595E-027	3.9644433E-029
2.2685274E-029	-7.7368882E-030	3.6335792E-029	-1.5059595E-027	1.6176186E-011	-1.6817152E-029
-5.1530046E-030	-5.7922988E-028	-6.5859603E-029	3.9644433E-029	-1.6817152E-029	1.6176186E-011

The Engineering Constants (Approximated as Orthotropic)

E1 =	1.6073010E+011
E2 =	1.6073010E+011
E3 =	1.6073010E+011
G12 =	6.1819268E+010
G13 =	6.1819268E+010
G23 =	6.1819268E+010
nu12 =	3.0000000E-001
nu13 =	3.0000000E-001
nu23 =	3.0000000E-001

Results indicates an isotropic material which is not correct

3D - Solid H – Aperiodic in Y Direction – Periodic Mesh



The Effective Stiffness Matrix

2.1636744E+011	9.2728903E+010	9.2728903E+010	1.0330753E-006	4.2829382E-008	-3.0502063E-006
9.2728903E+010	2.1636744E+011	9.2728903E+010	3.8151261E-007	8.7664378E-008	-2.9679288E-006
9.2728903E+010	9.2728903E+010	2.1636744E+011	1.5120824E-006	5.5862323E-007	-1.7573384E-006
1.0330753E-006	3.8151261E-007	1.5120824E-006	6.1819268E+010	3.1780164E-007	2.1159164E-008
4.2829382E-008	8.7664378E-008	5.5862323E-007	3.1780164E-007	6.1819268E+010	1.9578054E-007
-3.0502063E-006	-2.9679288E-006	-1.7573384E-006	2.1159164E-008	1.9578054E-007	6.1819268E+010

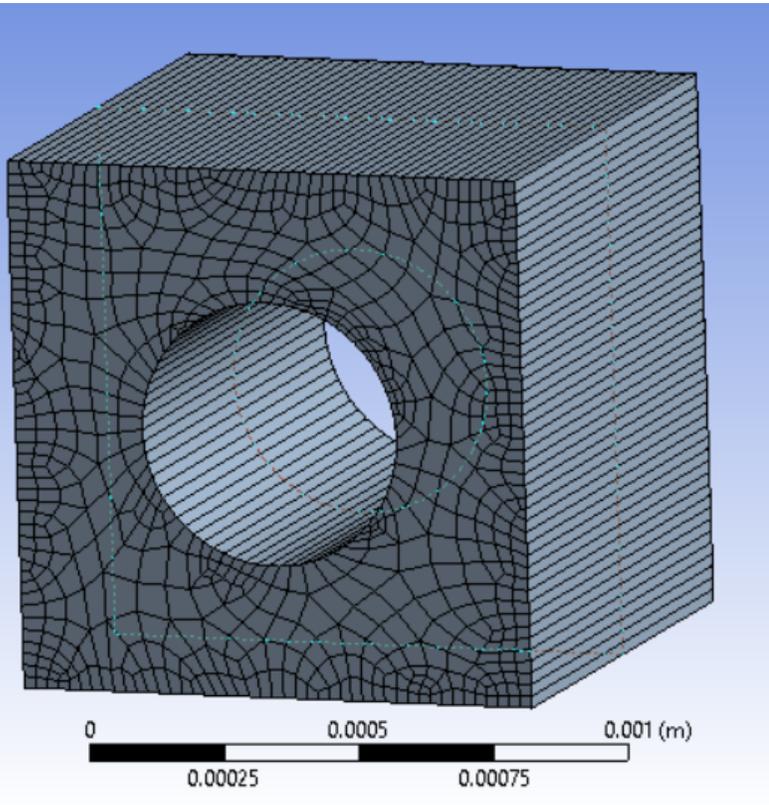
The Effective Compliance Matrix

6.2216101E-012	-1.8664830E-012	-1.8664830E-012	-4.6798173E-029	1.5202657E-029	1.6431063E-028
-1.8664830E-012	6.2216101E-012	-1.8664830E-012	3.8448708E-029	9.3366928E-030	1.5354591E-028
-1.8664830E-012	-1.8664830E-012	6.2216101E-012	-1.0946883E-028	-5.2280974E-029	-4.8410956E-030
-4.6798173E-029	3.8448708E-029	-1.0946883E-028	1.6176186E-011	-8.3158839E-029	-5.5366974E-030
1.5202657E-029	9.3366928E-030	-5.2280974E-029	-8.3158839E-029	1.6176186E-011	-5.1229699E-029
1.6431063E-028	1.5354591E-028	-4.8410956E-030	-5.5366974E-030	-5.1229699E-029	1.6176186E-011

The Engineering Constants (Approximated as Orthotropic)

E1 =	1.6073010E+011
E2 =	1.6073010E+011
E3 =	1.6073010E+011
G12 =	6.1819268E+010
G13 =	6.1819268E+010
G23 =	6.1819268E+010
nu12 =	3.0000000E-001
nu13 =	3.0000000E-001
nu23 =	3.0000000E-001

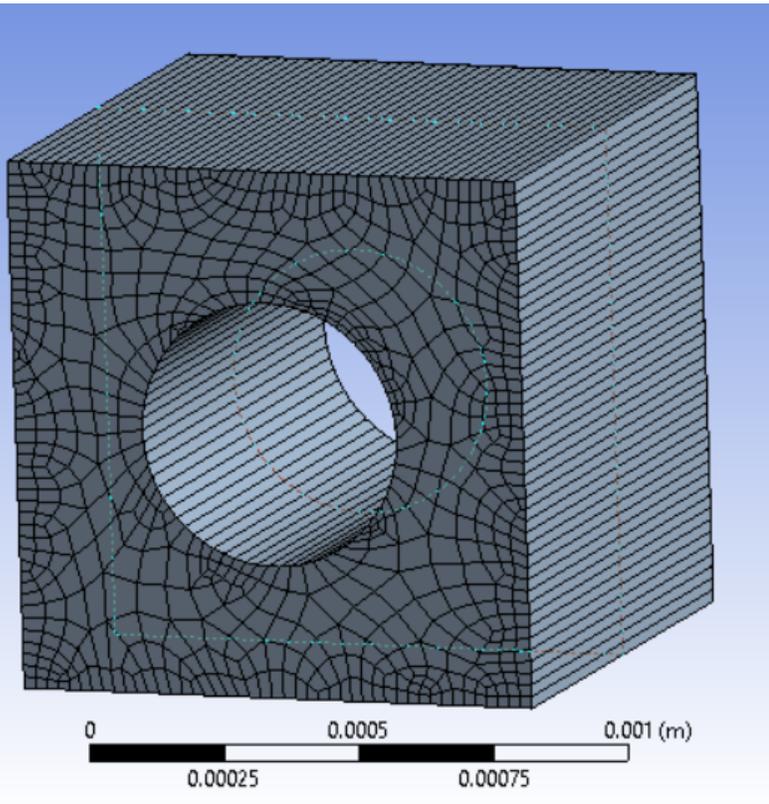
2D – Plate H – Periodic in 3 Direction – Quad Mesh



Messages	
	Text
Error	An error occurred inside the SOLVER module: general error.

- Even there is no problem with the license in previous models, the error is showing off and the homogenization does not work for next cases.

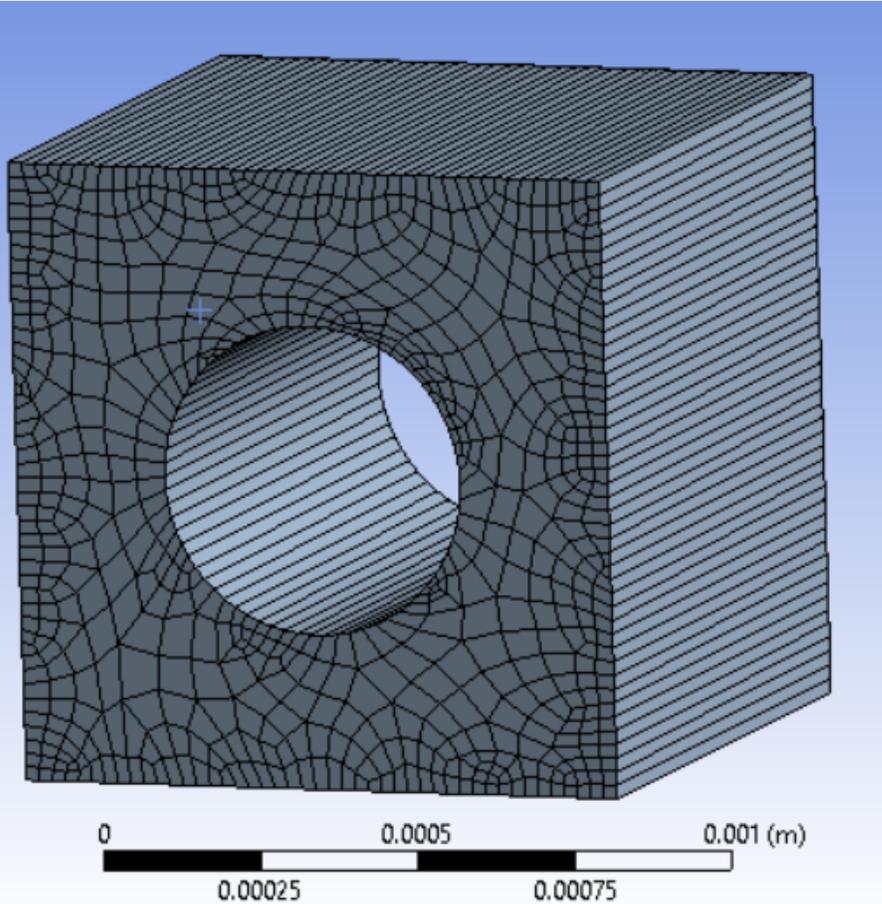
2D – Plate H – Aperiodic in Y Direction – Quad Mesh



Homogenization failed!
Please check the output:

```
*****  
*           SwiftComp 2.1           *  
*           *                       *  
* Multiscale Constitutive Modeling of Composites *  
*           *                       *  
* School of Aeronautics and Astronautics *  
* Purdue University                   *  
*           *                       *  
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*  
* prohibited. *  
*  
*****  
You can run SwiftComp for 0 days....  
  
SwiftComp begins at 100404.728  
Inputs echoed in file Eren Açar.sc.ech!  
  
Constitutive modeling for a 2D (plate/shell) model!  
  
Homogenization of aperiodic structures will be carried out!  
  
You are running SwiftComp with full integration!  
  
Finished reading/processing model file!  
  
Effective properties can be found in file Eren Açar.sc.k!  
  
determinant of Jacobian matrix less than 0 for element  
1. The first several nodes of distorted element are: 1980  
9.2749779999999995E-004 0.0000000000000000 1921  
9.5118459999999998E-004 0.0000000000000000 1988  
9.33
```

2D – Solid H – Periodic in 3 Direction – Quad Mesh



Homogenization failed!
Please check the output:

```

*****
*           SwiftComp 2.1           *
*                                     *
*   Multiscale Constitutive Modeling of Composites   *
*                                     *
*   School of Aeronautics and Astronautics   *
*   Purdue University                         *
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* prohibited.
*
*****
You can run SwiftComp for 0 days....

SwiftComp begins at 102957.682
Inputs echoed in file Eren Açar.sc.ech!

Constitutive modeling for a 3D model!

Homogenization of aperiodic structures will be carried out!

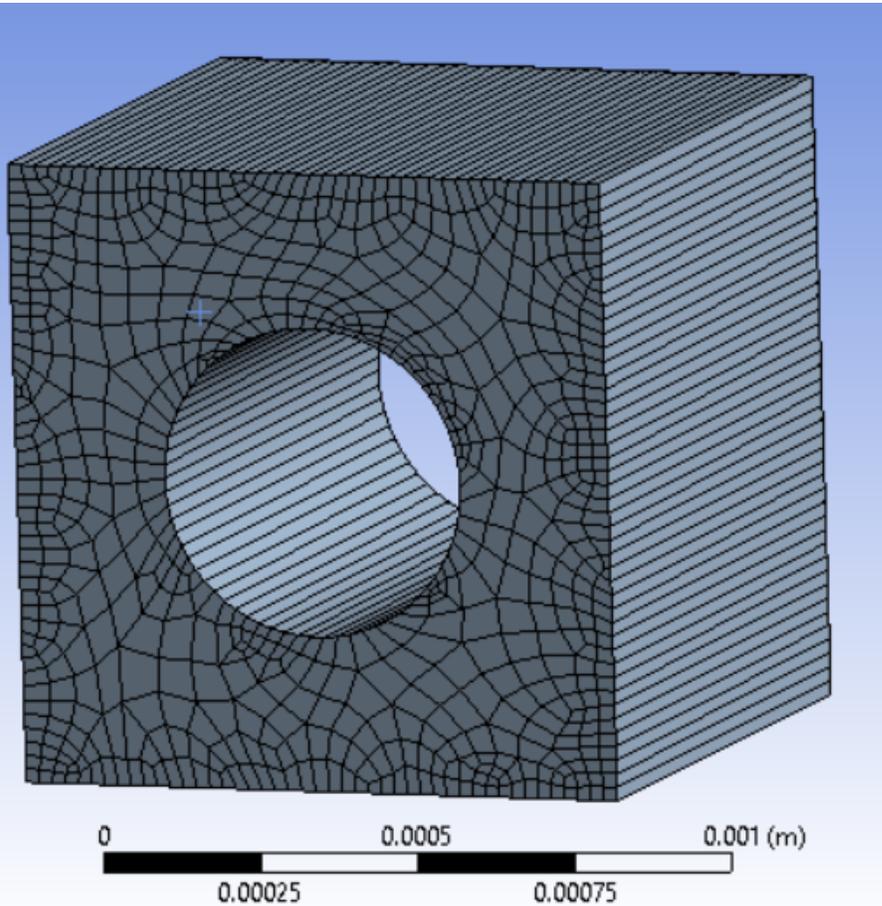
You are running SwiftComp with full integration!

Finished reading/processing model file!

Effective properties can be found in file Eren Açar.sc.k!

determinant of Jacobian matrix less than 0 for element
1. The first several nodes of distorted element are: 1980
9.2749779999999995E-004 0.0000000000000000 1921
9.5118459999999998E-004 0.0000000000000000 1988
9.33
    
```

2D – Solid H – Aperiodic in Y Direction – Quad Mesh



Homogenization failed!
Please check the output:

```
*****
*                               *
*           SwiftComp 2.1       *
*                               *
* Multiscale Constitutive Modeling of Composites *
*                               *
* School of Aeronautics and Astronautics *
* Purdue University             *
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* prohibited.                  *
*                               *
*****
You can run SwiftComp for 0 days....

SwiftComp begins at 102957.682
Inputs echoed in file Eren Açar.sc.ech!

Constitutive modeling for a 3D model!

Homogenization of aperiodic structures will be carried out!

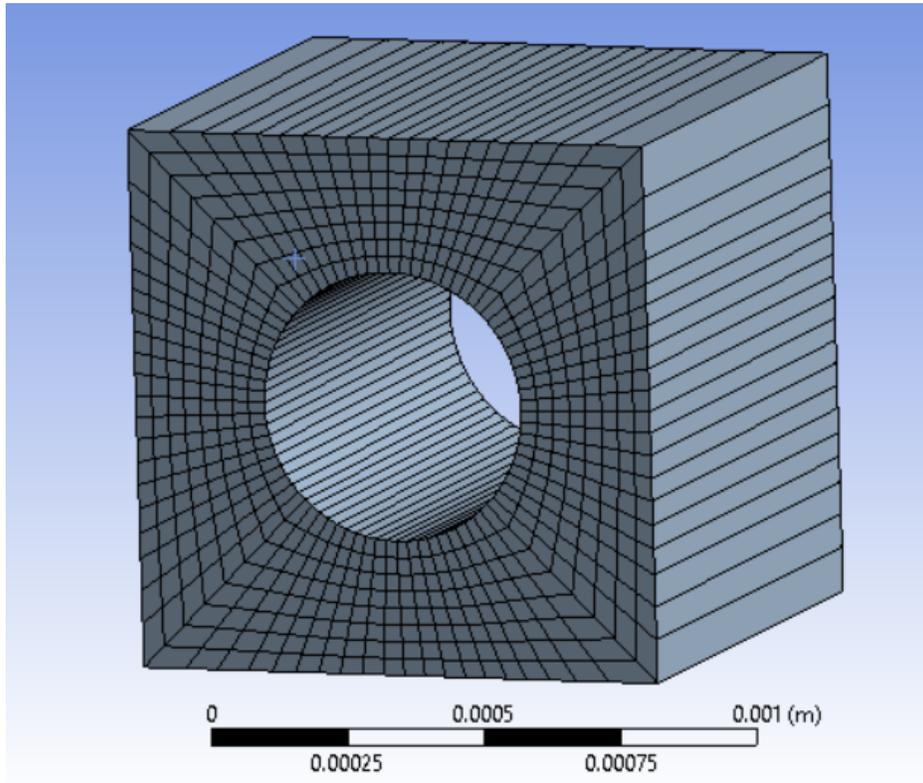
You are running SwiftComp with full integration!

Finished reading/processing model file!

Effective properties can be found in file Eren Açar.sc.k!

determinant of Jacobian matrix less than 0 for element
1. The first several nodes of distorted element are: 1980
9.2749779999999995E-04 0.0000000000000000 1921
9.5118459999999998E-04 0.0000000000000000 1988
9.33
```

2D – Plate H – Aperiodic in Y Direction – Periodic Mesh



Homogenization failed!
Please check the output:

```

*****
*                               *
*       SwiftComp 2.1           *
*                               *
*   Multiscale Constitutive Modeling of Composites *
*                               *
*   School of Aeronautics and Astronautics *
*   Purdue University           *
*                               *
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*                               *
*****
You can run SwiftComp for 0 days....

SwiftComp begins at 100658.678
Inputs echoed in file Eren Açar.sc.ech!

Constitutive modeling for a 2D (plate/shell) model!

Homogenization of aperiodic structures will be carried out!

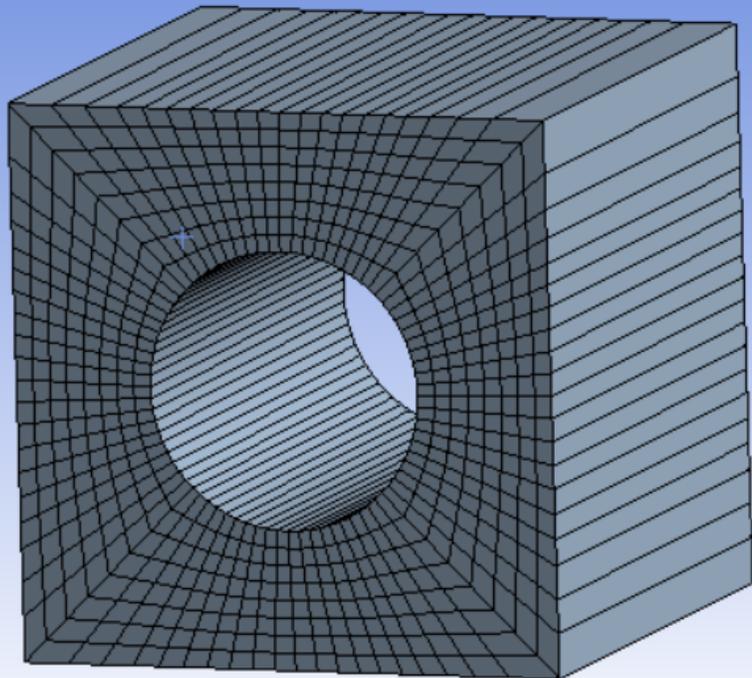
You are running SwiftComp with full integration!

Finished reading/processing model file!

Effective properties can be found in file Eren Açar.sc.k!

determinant of Jacobian matrix less than 0 for element
1. The first several nodes of distorted element are: 527
6.7757180000000002E-004 0.0000000000000000 548
7.1787529999999997E-004 0.0000000000000000 555
7.28
    
```

2D – Plate H – Periodic in 3 Direction – Periodic Mesh



Homogenization failed!
Please check the output:

```

*****
*           SwiftComp 2.1           *
*           *                       *
* Multiscale Constitutive Modeling of Composites *
*           *                       *
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*****

```

You can run SwiftComp for 0 days....

SwiftComp begins at 100912.477
Inputs echoed in file Eren Açar.sc.ech!

Constitutive modeling for a 2D (plate/shell) model!

Homogenization will be carried out!

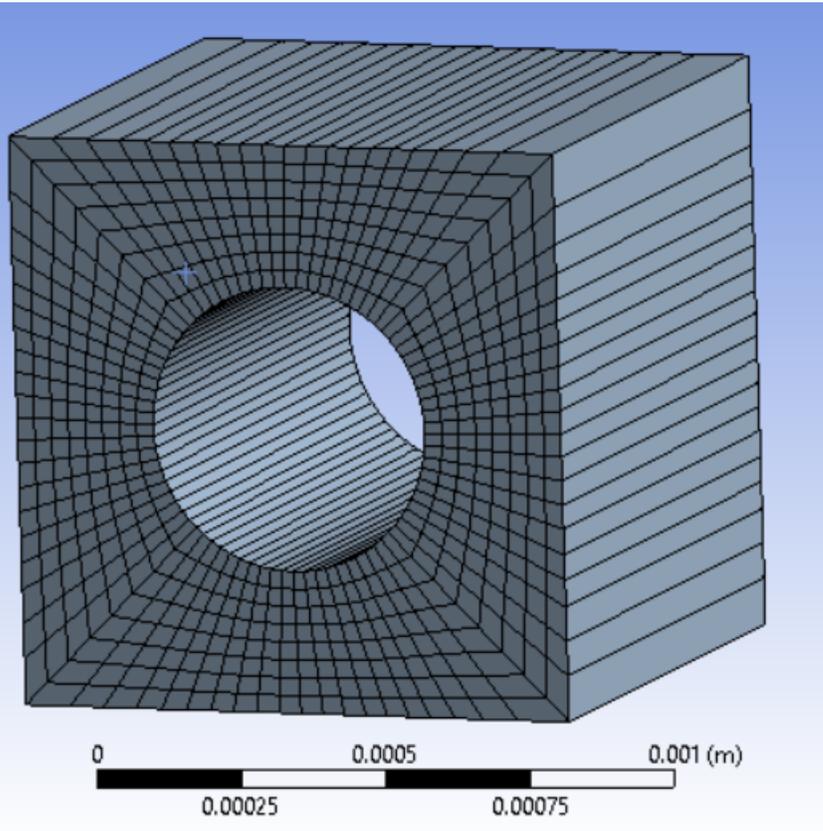
You are running SwiftComp with full integration!

Warning: there are a total of 41 aperiodic nodes out of total 41 nodes on y2 edge!
Finished reading/processing model file!

Effective properties can be found in file Eren Açar.sc.k!

determinant of Jacobian matrix less than 0 for element 1. The first several nodes of distorted element are: 130 6.7757180000000002E-004
0.0000000000000000 211 7.1787529999999997E-004 0.0000000000000000 210 7.28

2D – Solid H – Periodic in 3 Direction – Periodic Mesh



```

i Homogenization failed!
  Please check the output:
*****
*           SwiftComp 2.1           *
*           *                       *
* Multiscale Constitutive Modeling of Composites *
*           *                       *
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*****
You can run SwiftComp for 0 days....

SwiftComp begins at 101803.057
Inputs echoed in file Eren Açar.sc.ech!

Constitutive modeling for a 3D model!

Homogenization will be carried out!

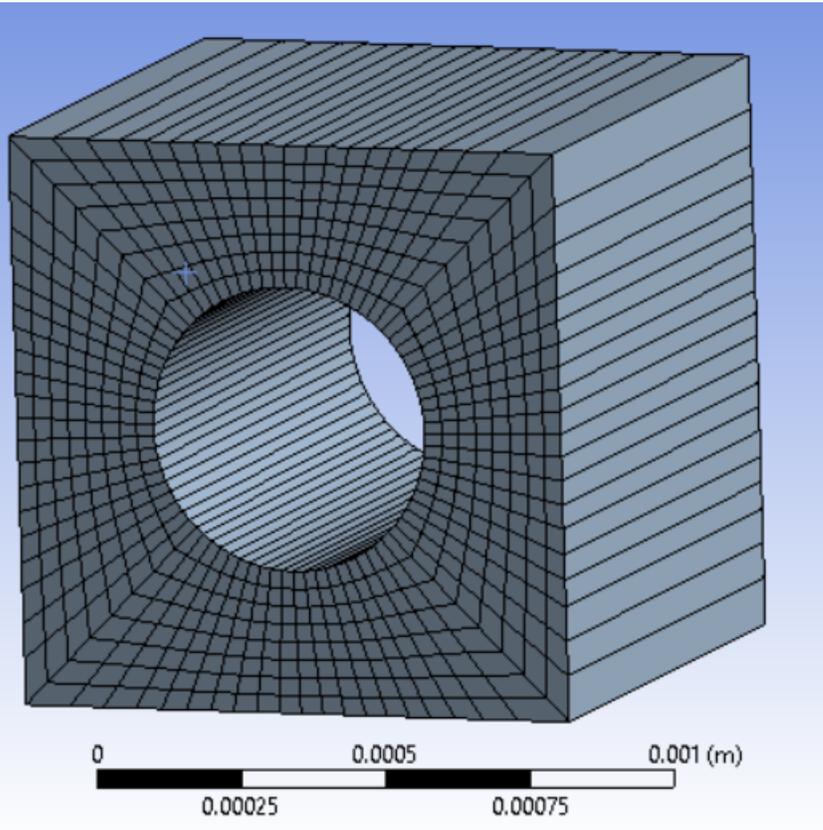
You are running SwiftComp with full integration!

Warning: there are a total of 41 aperiodic nodes out of total 41 nodes on y2 edge!
Finished reading/processing model file!

Effective properties can be found in file Eren Açar.sc.k!

determinant of Jacobian matrix less than 0 for element 1. The first several nodes of distorted element are: 130 6.775718000000000000E-04
0.0000000000000000 211 7.17875299999999997E-004 0.0000000000000000 210 7.28
    
```

2D – Solid H – APeriodic in Y Direction – Periodic Mesh



```

i Homogenization failed!
  Please check the output:

*****
*           SwiftComp 2.1           *
*           *                       *
* Multiscale Constitutive Modeling of Composites *
*           *                       *
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*****
You can run SwiftComp for 0 days....

SwiftComp begins at 102101.147
Inputs echoed in file Eren Açar.sc.ech!

Constitutive modeling for a 3D model!

Homogenization of aperiodic structures will be carried out!

You are running SwiftComp with full integration!

Finished reading/processing model file!

Effective properties can be found in file Eren Açar.sc.kl

determinant of Jacobian matrix less than 0 for element
1. The first several nodes of distorted element are: 527
6.7757180000000002E-004 0.0000000000000000 548
7.1787529999999997E-004 0.0000000000000000 555
7.28
  
```