B
Python Code

The python pre-script

```python
# −∗− coding : mbcs −∗−
# Do not delete the following import lines
from abaqus import *
from abaqusConstants import *
import __main__


import section
import regionToolset
import displayGroupMdbToolset as dgm
import part
import material
import assembly
import step
import interaction
import load
import mesh
import optimization
import job
import sketch
import visualization
import xyPlot
import displayGroupOdbToolset as dgo
import connectorBehavior
layupOrientation = None
p = mdb. models [ 'Model−1']. parts [ 'Part−1']

region1=p.sets [ 'P1']
region2=p.sets [ 'P2']
region3=p.sets [ 'P3']
region4=p.sets [ 'P4']

compositeLayup = mdb. models [ 'Model−1']. parts [ 'Part−1']. CompositeLayup (
    name='Layup2', description='', elementType=SHELL,
    offsetType=BOTTOM_SURFACE, symmetric=False ,
```

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36        thicknessAssignment=FROM_SECTION)
37  compositeLayup.Section(preIntegrate=OFF, integrationRule=SIMPSON,
38        thicknessType=UNIFORM, poissonDefinition=DEFAULT, temperature=GRADIENT,
39        useDensity=OFF)
40  compositeLayup.ReferenceOrientation(orientationType=GLOBAL, localCsys=None,
41        fieldName='', additionalRotationType=ROTATION_NONE, angle=0.0,
42        axis=AXIS_3)
43
44  compositeLayup.CompositePly(suppressed=False, plyName='P1-1',
45        region=region1, material='UD', thicknessType=SPECIFY_THICKNESS,
46        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=11.0,
47        additionalRotationType=ROTATION_NONE, additionalRotationField='',
48        axis=AXIS_3, angle=0.0, numIntPoints=3)
49
50  compositeLayup.CompositePly(suppressed=False, plyName='P1-2',
51        region=region1, material='UD', thicknessType=SPECIFY_THICKNESS,
52        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=12.0,
53        additionalRotationType=ROTATION_NONE, additionalRotationField='',
54        axis=AXIS_3, angle=0.0, numIntPoints=3)
55
56  compositeLayup.CompositePly(suppressed=False, plyName='P1-3',
57        region=region1, material='UD', thicknessType=SPECIFY_THICKNESS,
58        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=13.0,
59        additionalRotationType=ROTATION_NONE, additionalRotationField='',
60        axis=AXIS_3, angle=0.0, numIntPoints=3)
61
62  compositeLayup.CompositePly(suppressed=False, plyName='P1-4',
63        region=region1, material='UD', thicknessType=SPECIFY_THICKNESS,
64        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=14.0,
65        additionalRotationType=ROTATION_NONE, additionalRotationField='',
66        axis=AXIS_3, angle=0.0, numIntPoints=3)
67
68  compositeLayup.CompositePly(suppressed=False, plyName='P1-5',
69        region=region1, material='UD', thicknessType=SPECIFY_THICKNESS,
70        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=15.0,
71        additionalRotationType=ROTATION_NONE, additionalRotationField='',
72        axis=AXIS_3, angle=0.0, numIntPoints=3)
73
74  compositeLayup.CompositePly(suppressed=False, plyName='P2-1',
75        region=region2, material='UD', thicknessType=SPECIFY_THICKNESS,
76        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=21.0,
77        additionalRotationType=ROTATION_NONE, additionalRotationField='',
78        axis=AXIS_3, angle=0.0, numIntPoints=3)
79
80  compositeLayup.CompositePly(suppressed=False, plyName='P2-2',
81        region=region2, material='UD', thicknessType=SPECIFY_THICKNESS,
82        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=22.0,
83        additionalRotationType=ROTATION_NONE, additionalRotationField='',
84        axis=AXIS_3, angle=0.0, numIntPoints=3)
85
86  compositeLayup.CompositePly(suppressed=False, plyName='P2-3',
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87      region=region2 , material='UD' , thicknessType=SPECIFY_THICKNESS,
88      thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =23.0 ,
89      additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
90      axis=AXIS_3 , angle =0.0 , numIntPoints=3)
91
92 compositeLayup . CompositePly ( suppressed=False , plyName='P2−4' ,
93      region=region2 , material='UD' , thicknessType=SPECIFY_THICKNESS,
94      thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =24.0 ,
95      additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
96      axis=AXIS_3 , angle =0.0 , numIntPoints=3)
97
98 compositeLayup . CompositePly ( suppressed=False , plyName='P2−5' ,
99      region=region2 , material='UD' , thicknessType=SPECIFY_THICKNESS,
100     thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =25.0 ,
101     additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
102     axis=AXIS_3 , angle =0.0 , numIntPoints=3)
103
104
105 compositeLayup . CompositePly ( suppressed=False , plyName='P3−1' ,
106     region=region3 , material='UD' , thicknessType=SPECIFY_THICKNESS,
107     thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =31.0 ,
108     additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
109     axis=AXIS_3 , angle =0.0 , numIntPoints=3)
110
111 compositeLayup . CompositePly ( suppressed=False , plyName='P3−2' ,
112     region=region3 , material='UD' , thicknessType=SPECIFY_THICKNESS,
113     thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =32.0 ,
114     additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
115     axis=AXIS_3 , angle =0.0 , numIntPoints=3)
116
117 compositeLayup . CompositePly ( suppressed=False , plyName='P3−3' ,
118     region=region3 , material='UD' , thicknessType=SPECIFY_THICKNESS,
119     thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =33.0 ,
120     additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
121     axis=AXIS_3 , angle =0.0 , numIntPoints=3)
122
123 compositeLayup . CompositePly ( suppressed=False , plyName='P3−4' ,
124     region=region3 , material='UD' , thicknessType=SPECIFY_THICKNESS,
125     thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =34.0 ,
126     additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
127     axis=AXIS_3 , angle =0.0 , numIntPoints=3)
128
129 compositeLayup . CompositePly ( suppressed=False , plyName='P3−5' ,
130     region=region3 , material='UD' , thicknessType=SPECIFY_THICKNESS,
131     thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =35.0 ,
132     additionalRotationType=ROTATION_NONE, additionalRotationField='' ,
133     axis=AXIS_3 , angle =0.0 , numIntPoints=3)
134
135 compositeLayup . CompositePly ( suppressed=False , plyName='P4−1' ,
136     region=region4 , material='UD' , thicknessType=SPECIFY_THICKNESS,
137     thickness =0.3 , orientationType=SPECIFY_ORIENT, orientationValue =41.0 ,
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138        additionalRotationType=ROTATION_NONE, additionalRotationField='',
139        axis=AXIS_3, angle=0.0, numIntPoints=3)

140

141 compositeLayup.CompositePly(suppressed=False, plyName='P4-2',
142        region=region4, material='UD', thicknessType=SPECIFY_THICKNESS,
143        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=42.0,
144        additionalRotationType=ROTATION_NONE, additionalRotationField='',
145        axis=AXIS_3, angle=0.0, numIntPoints=3)

146

147 compositeLayup.CompositePly(suppressed=False, plyName='P4-3',
148        region=region4, material='UD', thicknessType=SPECIFY_THICKNESS,
149        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=43.0,
150        additionalRotationType=ROTATION_NONE, additionalRotationField='',
151        axis=AXIS_3, angle=0.0, numIntPoints=3)

152

153 compositeLayup.CompositePly(suppressed=False, plyName='P4-4',
154        region=region4, material='UD', thicknessType=SPECIFY_THICKNESS,
155        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=44.0,
156        additionalRotationType=ROTATION_NONE, additionalRotationField='',
157        axis=AXIS_3, angle=0.0, numIntPoints=3)

158

159 compositeLayup.CompositePly(suppressed=False, plyName='P4-5',
160        region=region4, material='UD', thicknessType=SPECIFY_THICKNESS,
161        thickness=0.3, orientationType=SPECIFY_ORIENT, orientationValue=45.0,
162        additionalRotationType=ROTATION_NONE, additionalRotationField='',
163        axis=AXIS_3, angle=0.0, numIntPoints=3)

164

165

166

167

168 p = mdb.models['Model-1'].parts['Part-1']
169 session.viewports['Viewport: 1'].setValues(displayedObject=p)
```