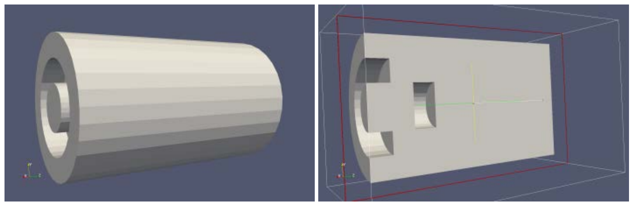
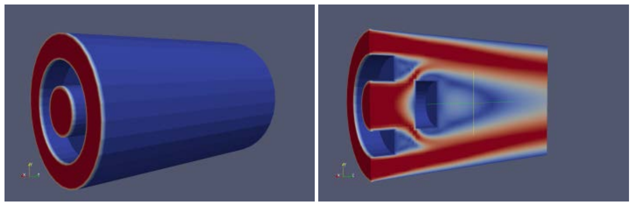
cylindricalMeshGenerator Tutorial

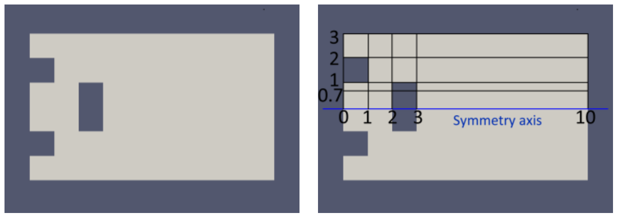
We will create the following geometry with a cylindrical obstacle inside:



There are two inlets, the inner and the outer, one outlet, and the obstacle and the periphery are solid walls.



Start by taking a slice of the geometry and sketching the upper half-plane with distances along the longitudinal (z) and radial (r) axes.

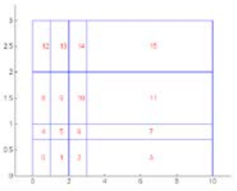


In the radial axis, we exclude r=0 and the first two points (0.7 and 1 in this example) are used for the internal "butterfly" grid .

Start the mesh generation by executing `cylindricalMeshGenerator( )` and selecting manual input mode. We input the z and r coordinates from the geometry sketch:

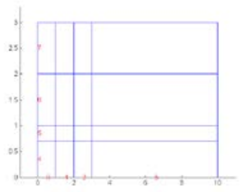
```
[0,1,2,3,10]
[0.7,1,2,3]
```

Then, choose the blocks that need to be excluded from the domain, using the block numbers of the MATLAB plot.



```
[2,6,8]
```

Choose the mesh size along the z and r directions, for the faces shown in the MATLAB plot, with the following sequence:



Start with face 0 (we keep the default, so just press ENTER).
Define the grading in the z direction.

```
        [1,1,1,4]
```

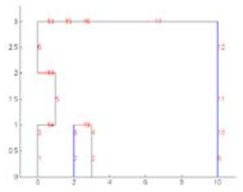
Check if the estimated axial mesh distribution is ok and if not define the desired distribution in array format (we keep the estimated distribution so hit ENTER).
Do the same for the radial direction, keeping the defaults for the next three steps.

Choose the `convertToMeters` parameter (we keep the default, so just press ENTER).

Give the arc rate of 1st row of internal blocks for the "butterfly" grid (we keep the default, so just press ENTER).

We can now inspect the geometry and the mesh without defining the boundaries, which will all be set to default, or proceed to define the boundaries. We choose the second, so we press 1.

The boundary MATLAB plot pops up and we select the faces that belong to each boundary.



```
        Give boundary name (in '...'): 'wall'
        Choose BC type 1 - wall, 2 - inlet, 3 - outlet, 4 - patch : 1
        Give array of boundary faces:[14,5,18,13,15,16,17,7,9,19,4,2]
```

```
etc
```

The `blockMeshDict` file is complete.

The procedure can be repeated automatically, with the input data defined at the beginning of the MATLAB file, using the auto-input option.

Have fun!