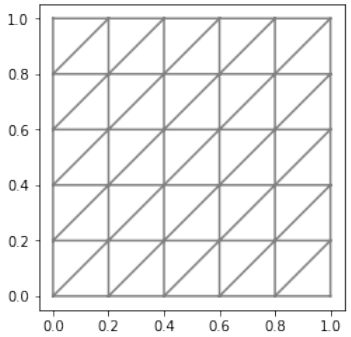
In [1]:
```
import matplotlib
%matplotlib inline
from dolfin import *
from adaptivity import *
parameters.plotting_backend = "matplotlib"
```

Input mesh

In [2]:
```
mesh = UnitSquareMesh(5,5)
plot(mesh)
```

Out[2]:
```
[<matplotlib.lines.Line2D at 0x112297c18>,
 <matplotlib.lines.Line2D at 0x12325d400>]
```



The metric

In [3]:
```
M  = mesh_metric(mesh)
Mp = refine_metric(M, 4)
```

Here the components of the metric tensors in each element

In [4]:
```
M00,M01,M10,M11=Mp.split(deepcopy=True)
print('M00 = ',M00.vector().array())
print('M01 = ',M01.vector().array())
print('M10 = ',M10.vector().array())
print('M11 = ',M11.vector().array())
```

```
M00 =  [ 400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.  400.
  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.
  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.
  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.
  400.  400.]
M01 =  [-200. -200. -200. -200. -200. -200. -200. -200. -200. -200.
-200. -200.
 -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -
200.
 -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -
200.
 -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -
200.
 -200. -200.]
M10 =  [-200. -200. -200. -200. -200. -200. -200. -200. -200. -200.
-200. -200.
 -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -
200.
 -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -
200.
 -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -200. -
200.
 -200. -200.]
M11 =  [ 400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.  400.
  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.
  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.
  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.  400.
400.
  400.  400.]
```

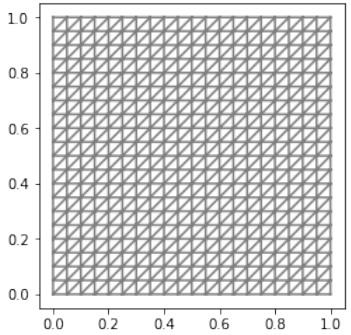
The refined mesh

This works only after commenting the assert. I get the assert error otherwise on the calling of `adapt`.

Adding a print in the C++ code for `Smooth. I get values of `mag` like `6.5166e-08`.

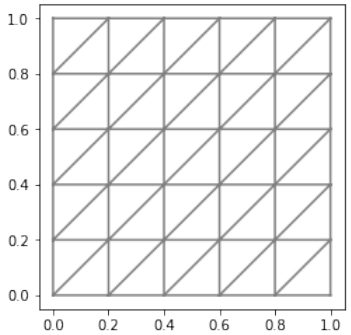
In [5]:
```
1 new_mesh, boundary_tags = adapt(Mp)
2 plot(new_mesh)
```

Out[5]:
```
[<matplotlib.lines.Line2D at 0x1234bfa20>,
 <matplotlib.lines.Line2D at 0x1234bfb70>]
```



In [6]:
```
1 new_mesh, boundary_tags = adapt(M)
2 plot(new_mesh)
```

Out[6]:
```
[<matplotlib.lines.Line2D at 0x12352e710>,
 <matplotlib.lines.Line2D at 0x12352e860>]
```



In [ ]:
```
1
```