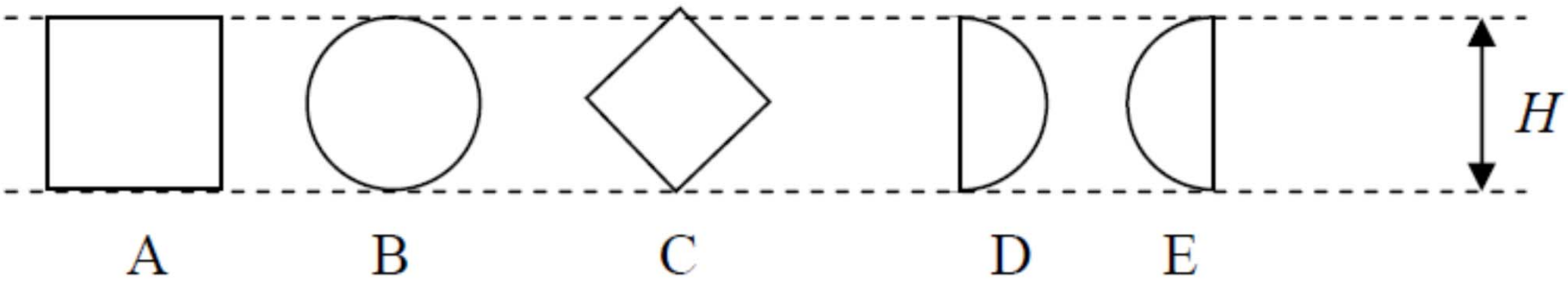
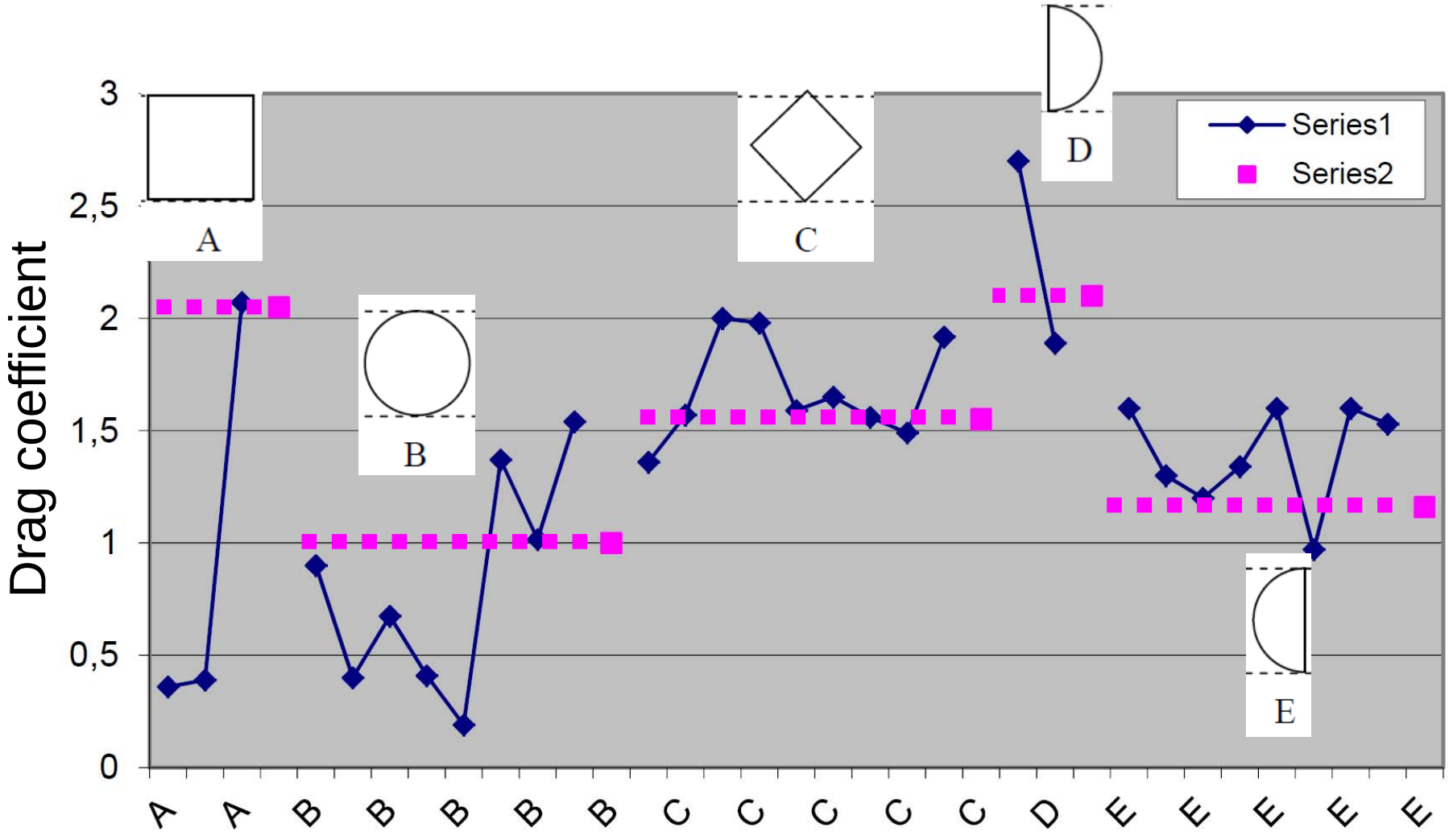
Individual task

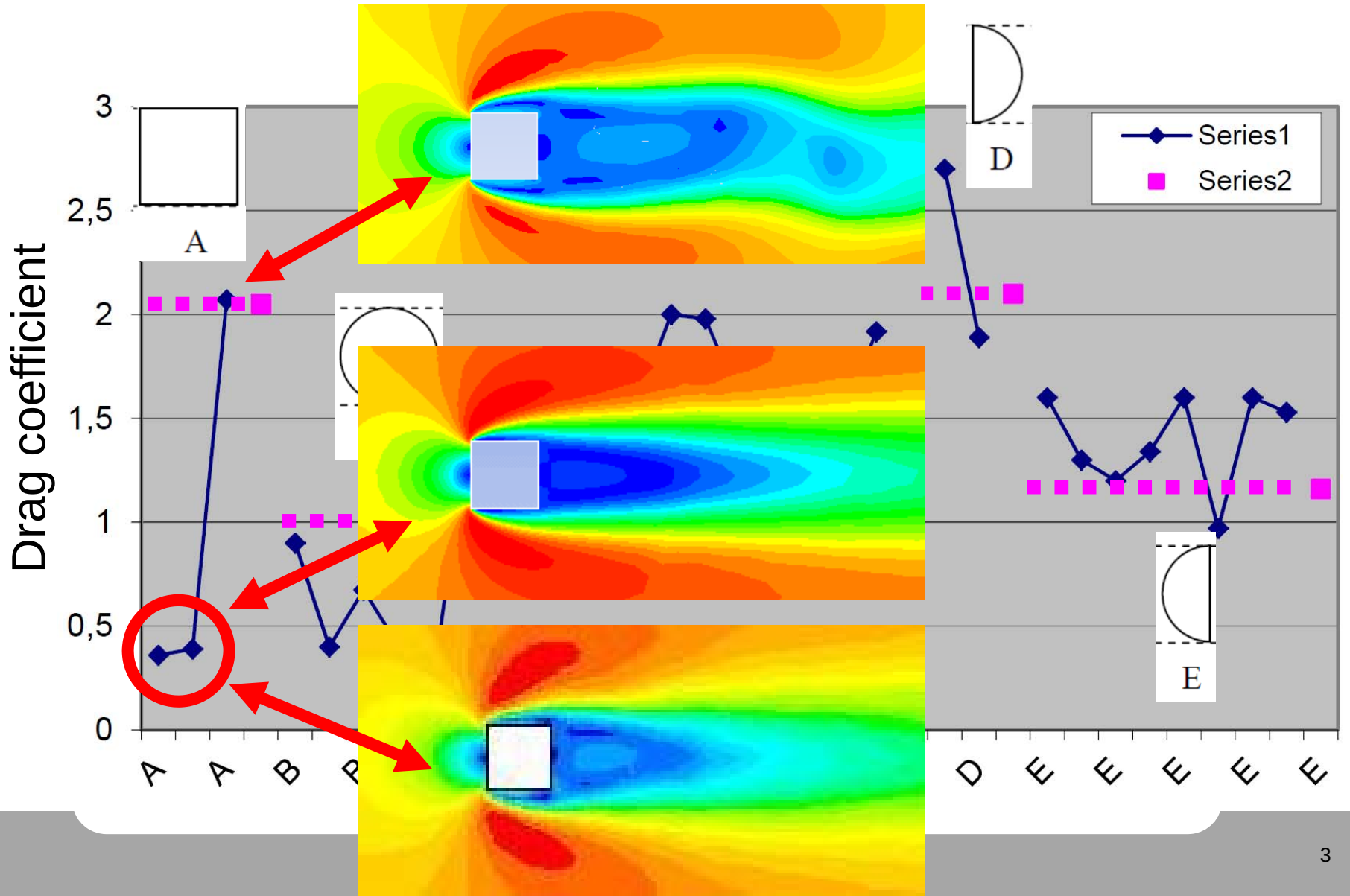
- Objective
  - Drag coefficient for a 2D object
- Before 18 April 12.00: Run the case – upload figures and drag



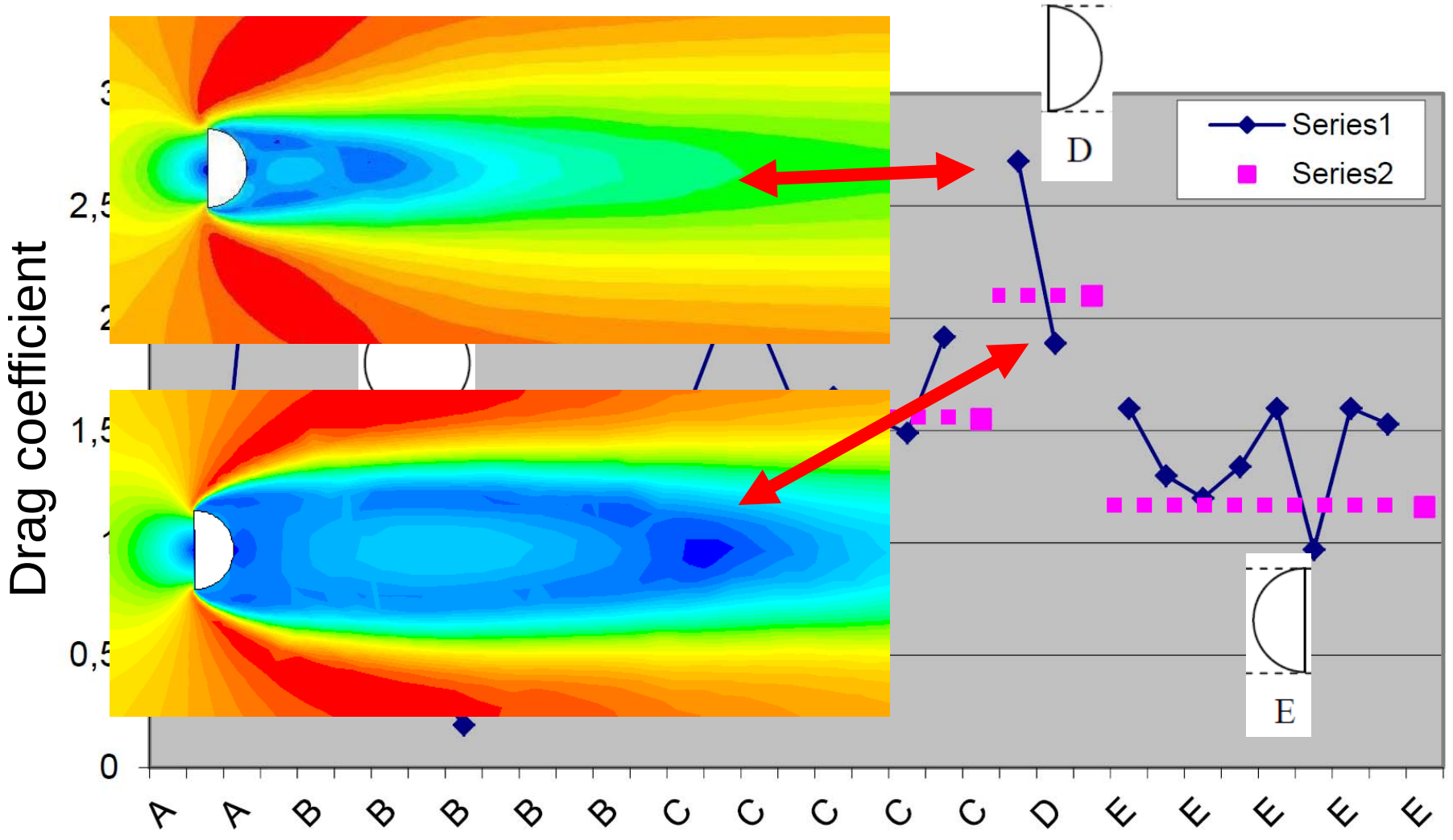
What can we learn?



Scaling?


Drag coefficient
3
2,5
2
1,5
1
0,5
0
A
D
E
Series1
Series2
A
A
B
D
E
E
E
E
E

Scaling?


Drag coefficient
3
2,5
2
1,5
1
0,5
0
A A B B B B B C C C C C D E E E E E
Series1
Series2
D
E

What is the question?

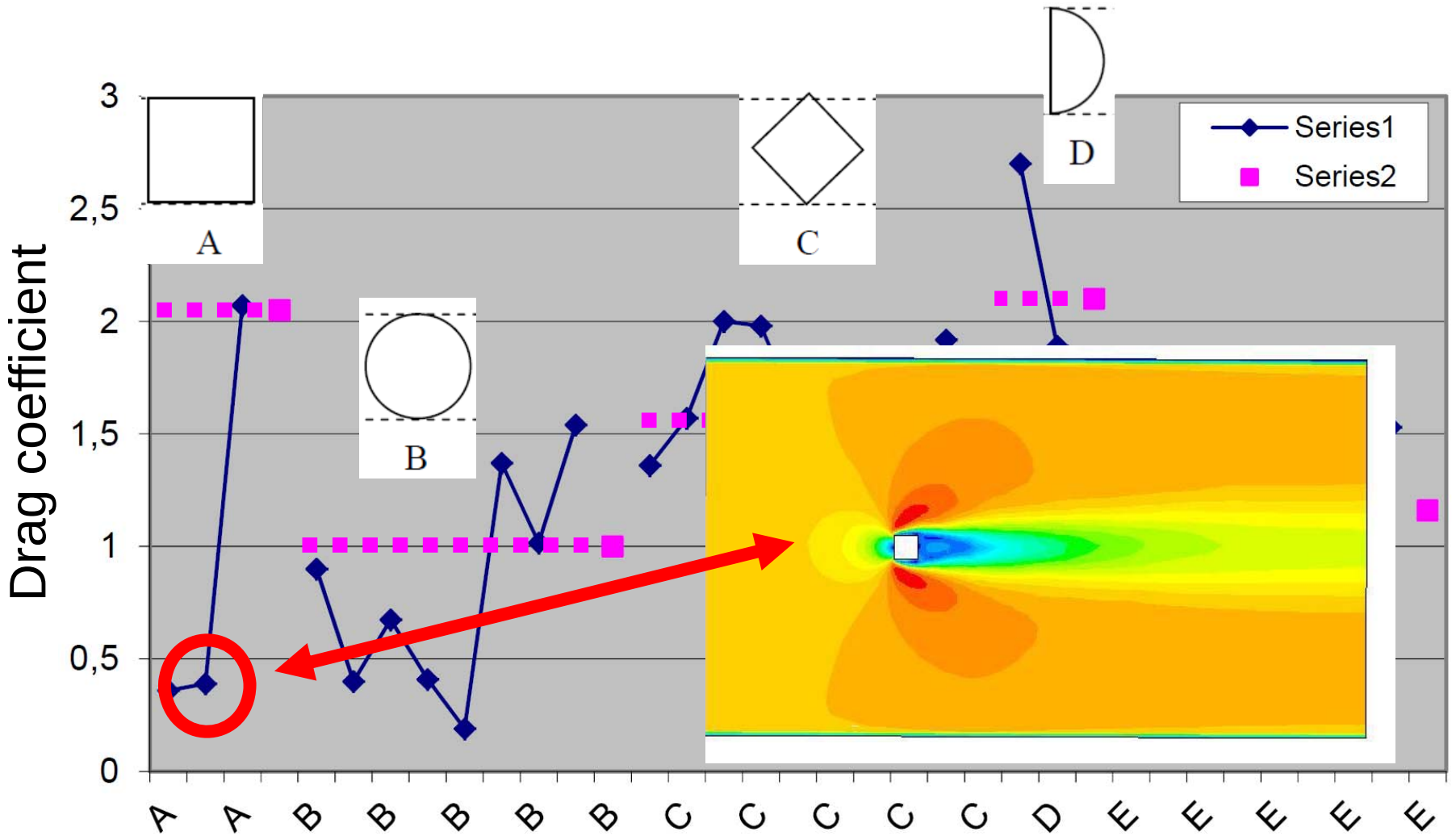
- Drag coefficient

$$C_D = \frac{2D}{\rho U^2 H}$$

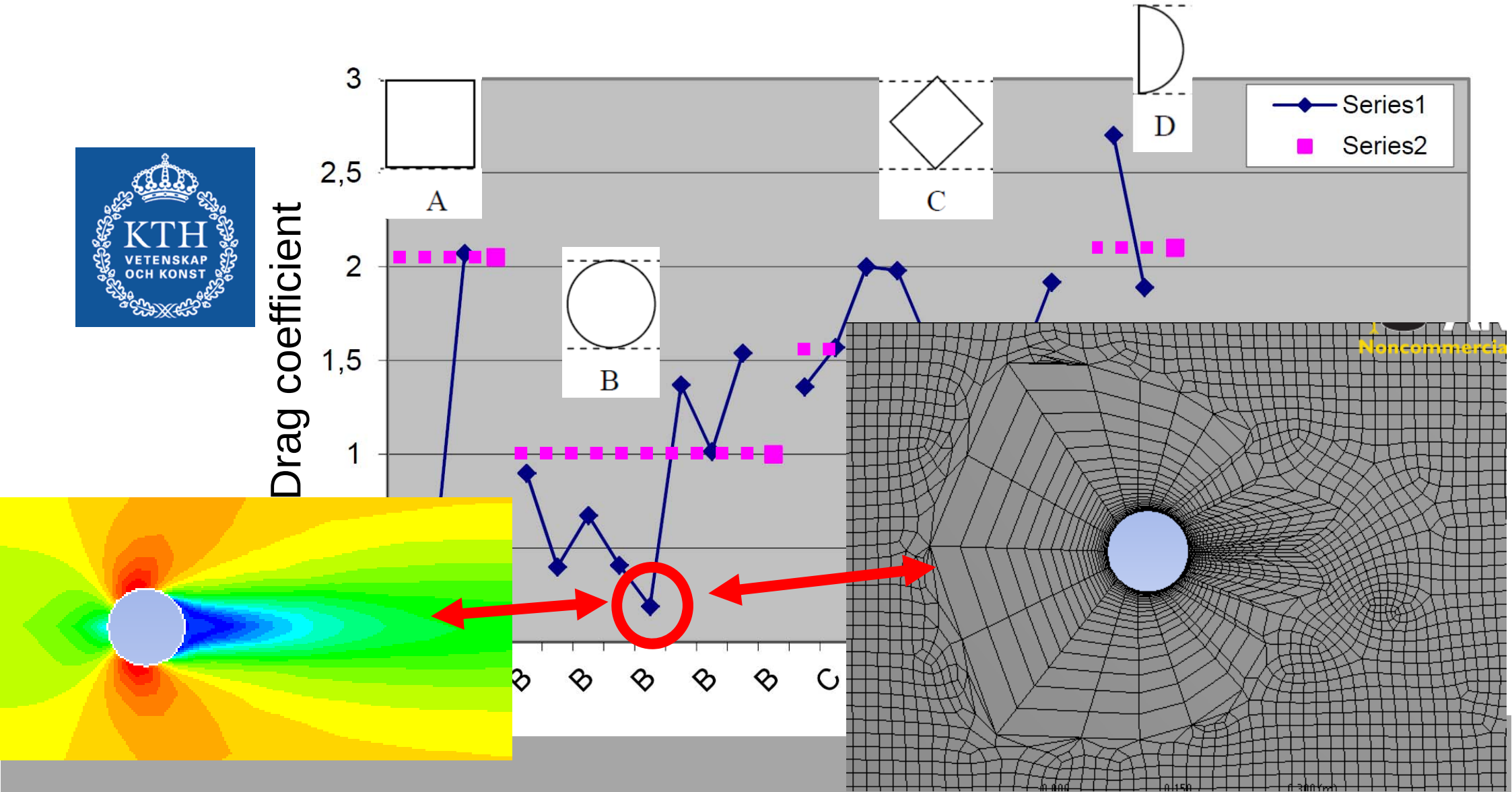
- D=1.2, ρ=1.2, U=1, H=2 -> Cd=1.0, not 2.0 or 1.2

```
Forces

                         Forces (n)
Zone                     Pressure                                        Viscous
object                   (1.2247356 -0.056028187 0)                      (-0.0087259216 4.0672516e-05
------------------------ ----------------------------------------------- ----------------------------
Net                      (1.2247356 -0.056028187 0)                      (-0.0087259216 4.0672516e-05

Forces - Direction Vector (1 0 0)
                         Forces (n)                                      Coefficients
Zone                     Pressure        Viscous         Total           Pressure        Viscous
object                   1.2247356       -0.0087259216   1.2160097       1.9995684       -0.01424640
------------------------ --------------- --------------- --------------- --------------- -----------
Net                      1.2247356       -0.0087259216   1.2160097       1.9995684       -0.01424640
```

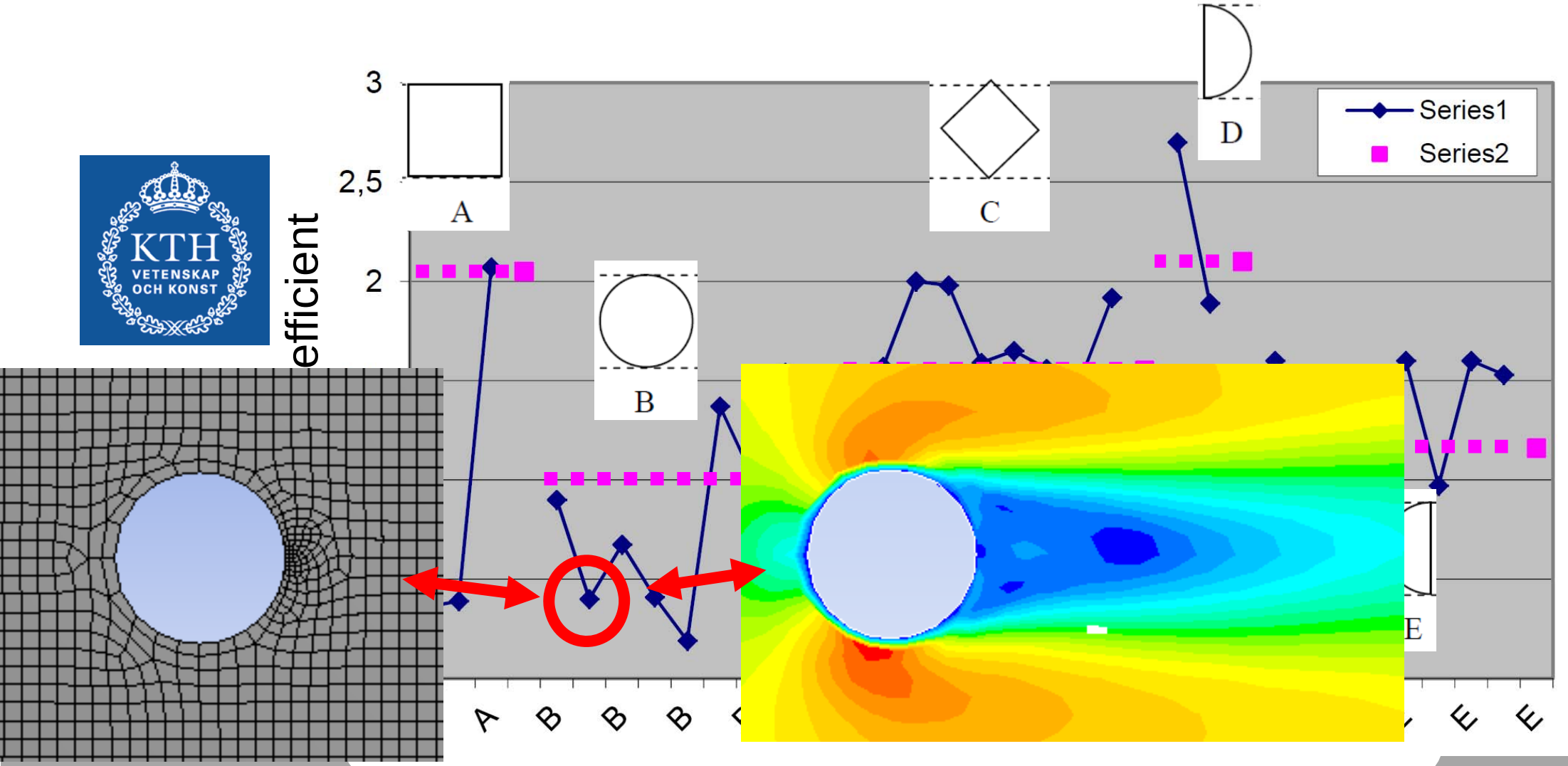
Setup?


Drag coefficient
3
2,5
2
1,5
1
0,5
0
A
B
C
D
Series1
Series2
A A B B B B B C C C C C D E E E E E

Quality?

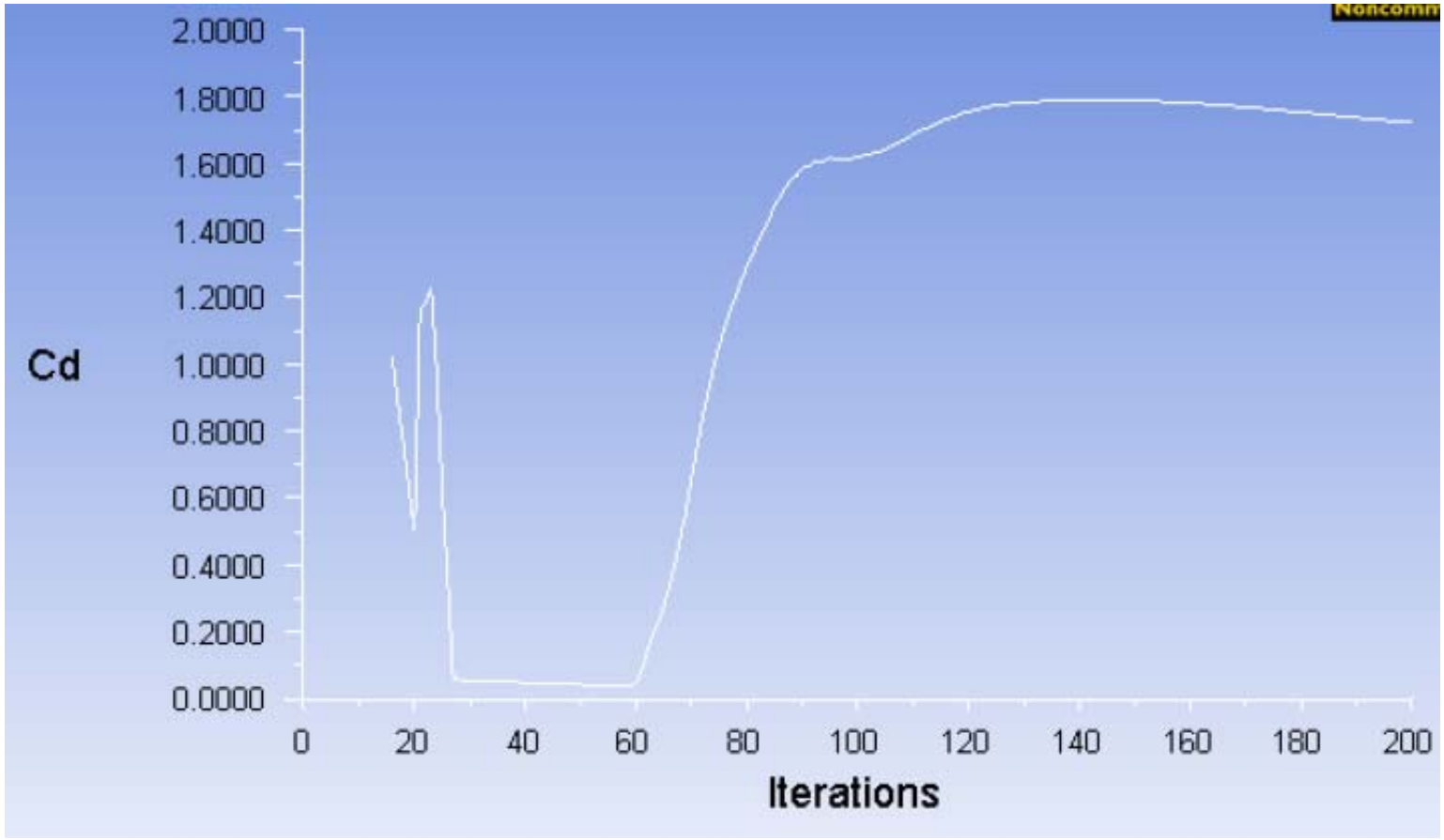


Quality?

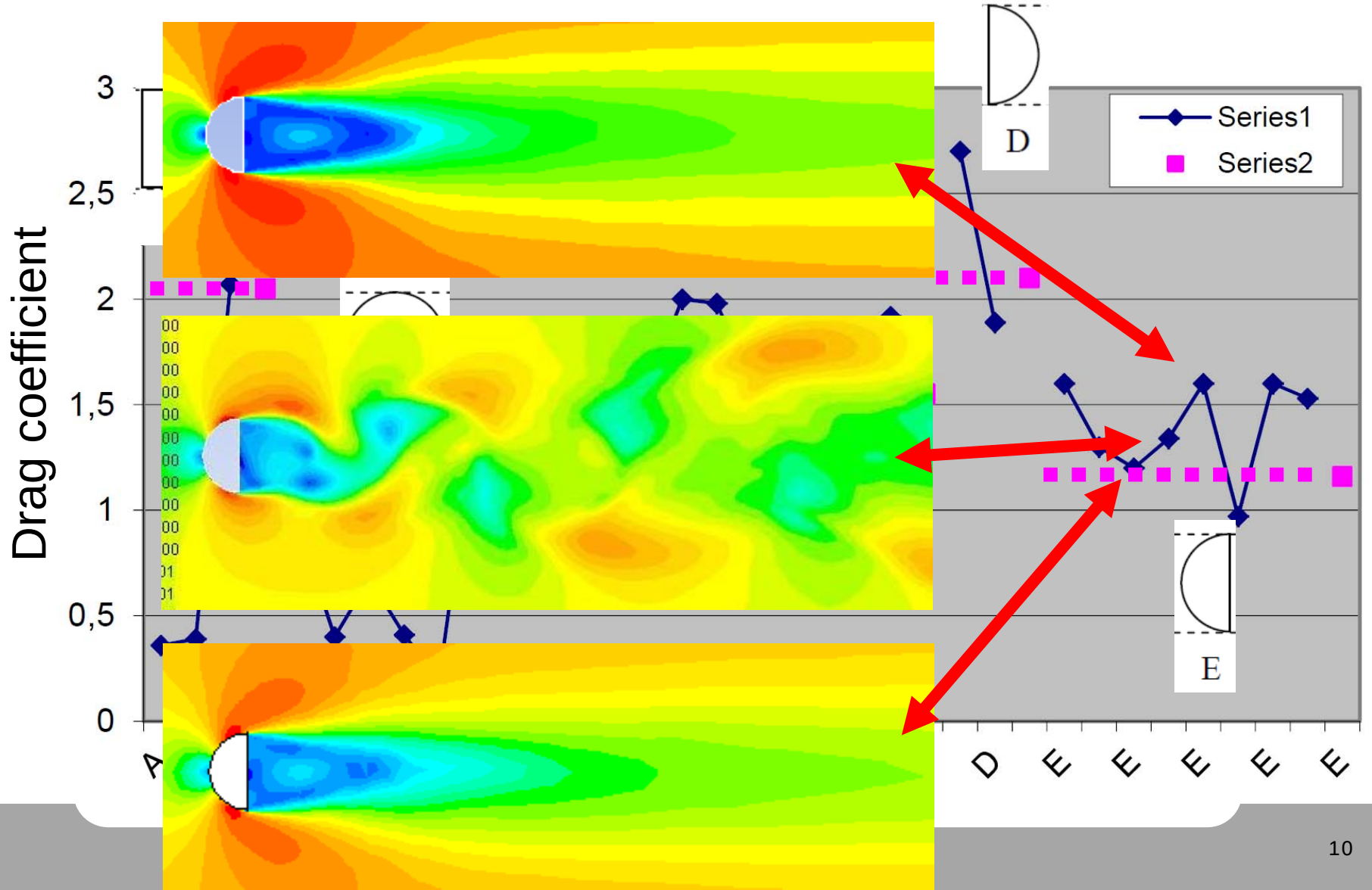


Convergence?

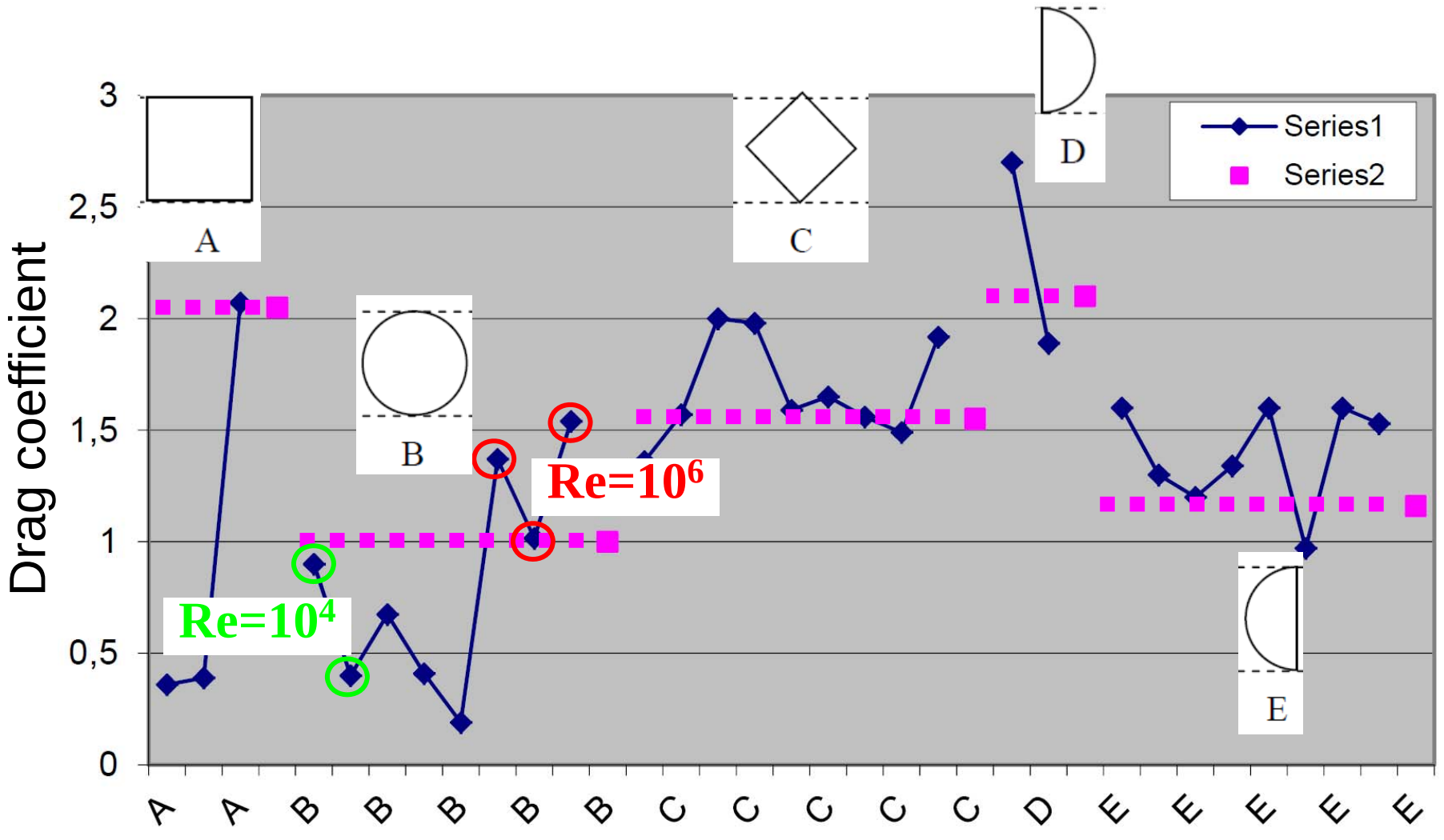
- Quantities of interest should not change with iteration



Modelling?

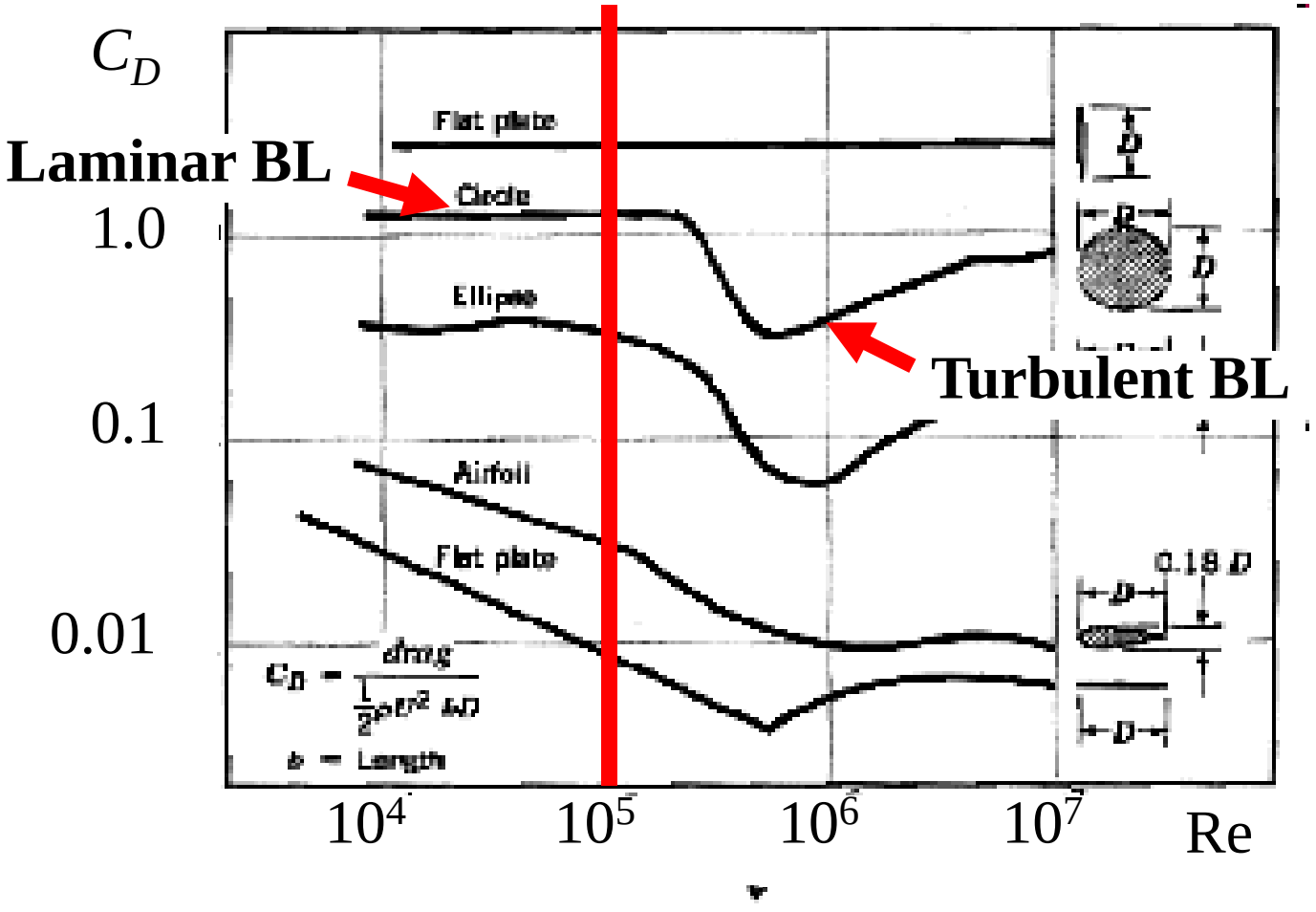


Systematic error?

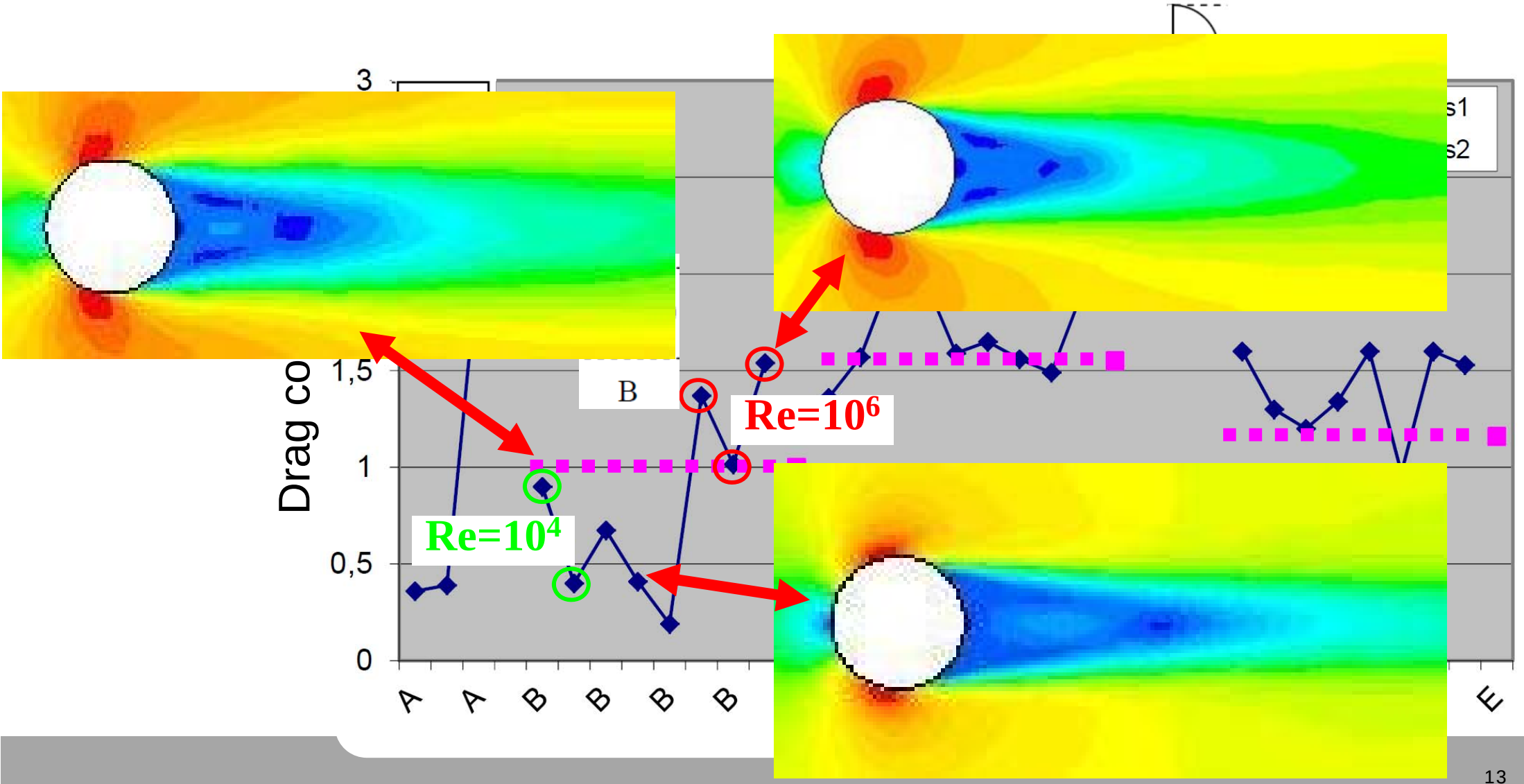


Transition?

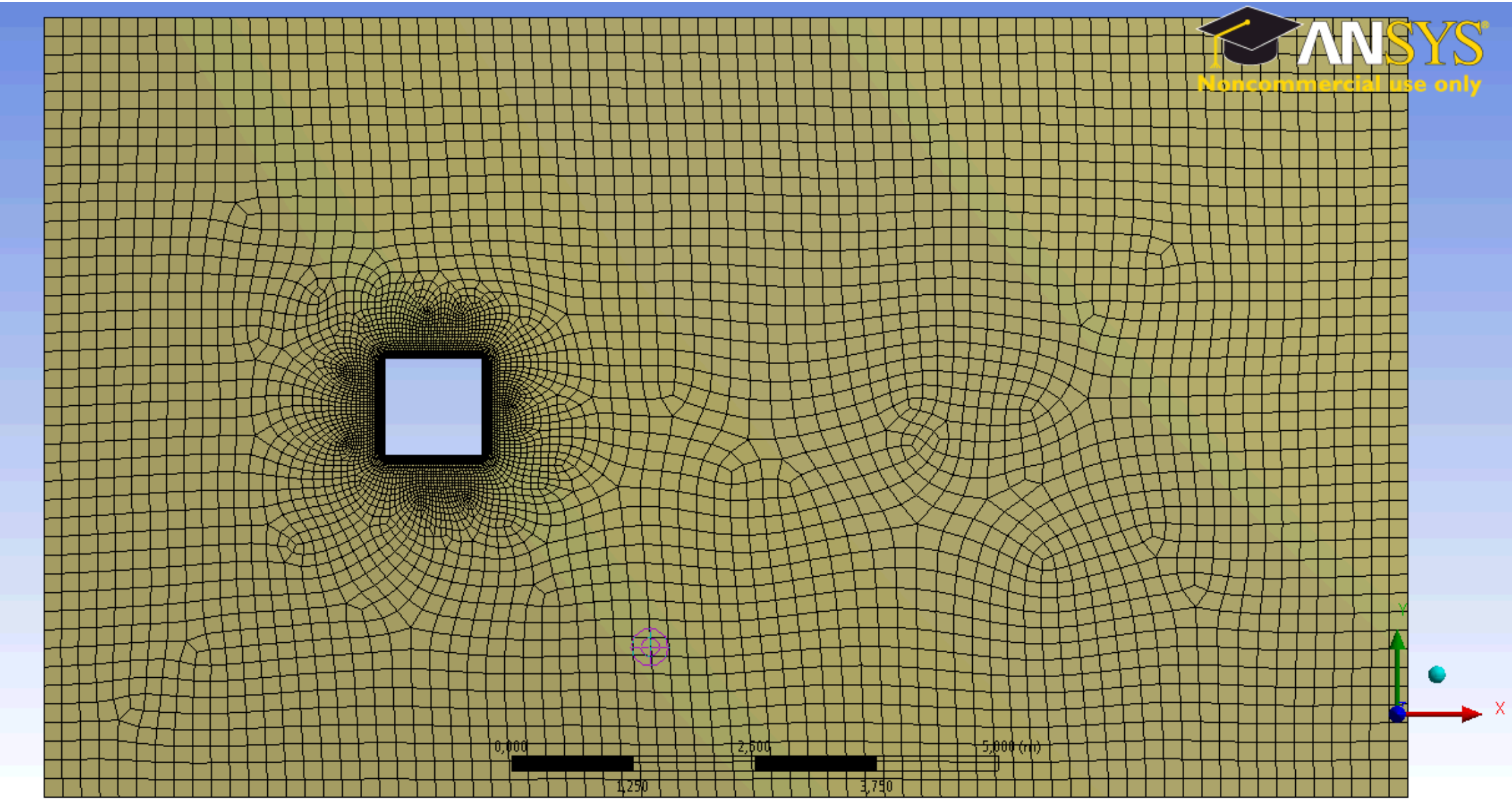
- Reynolds number L=1m, U=1m/s, air -> Re~10^5

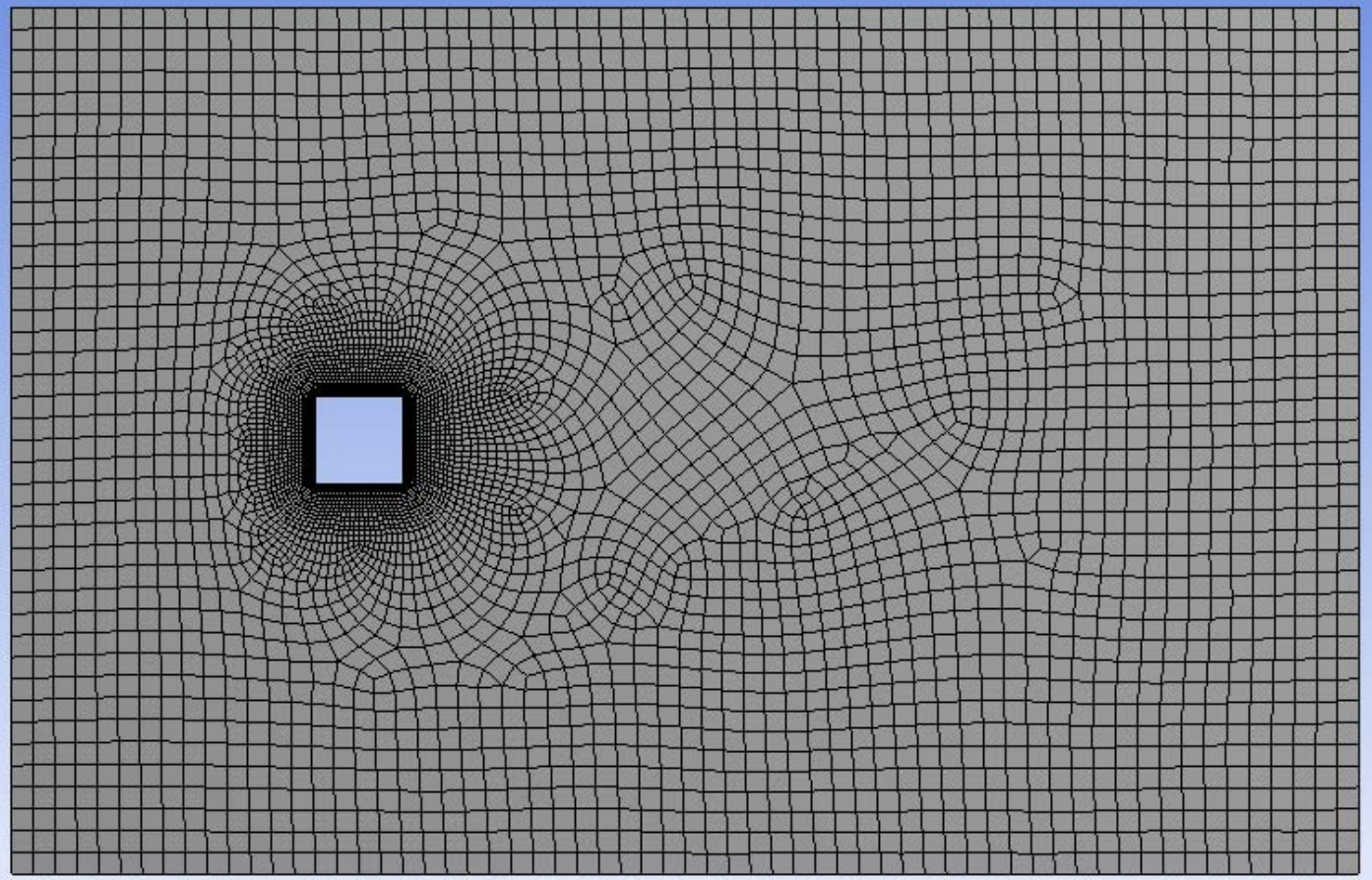


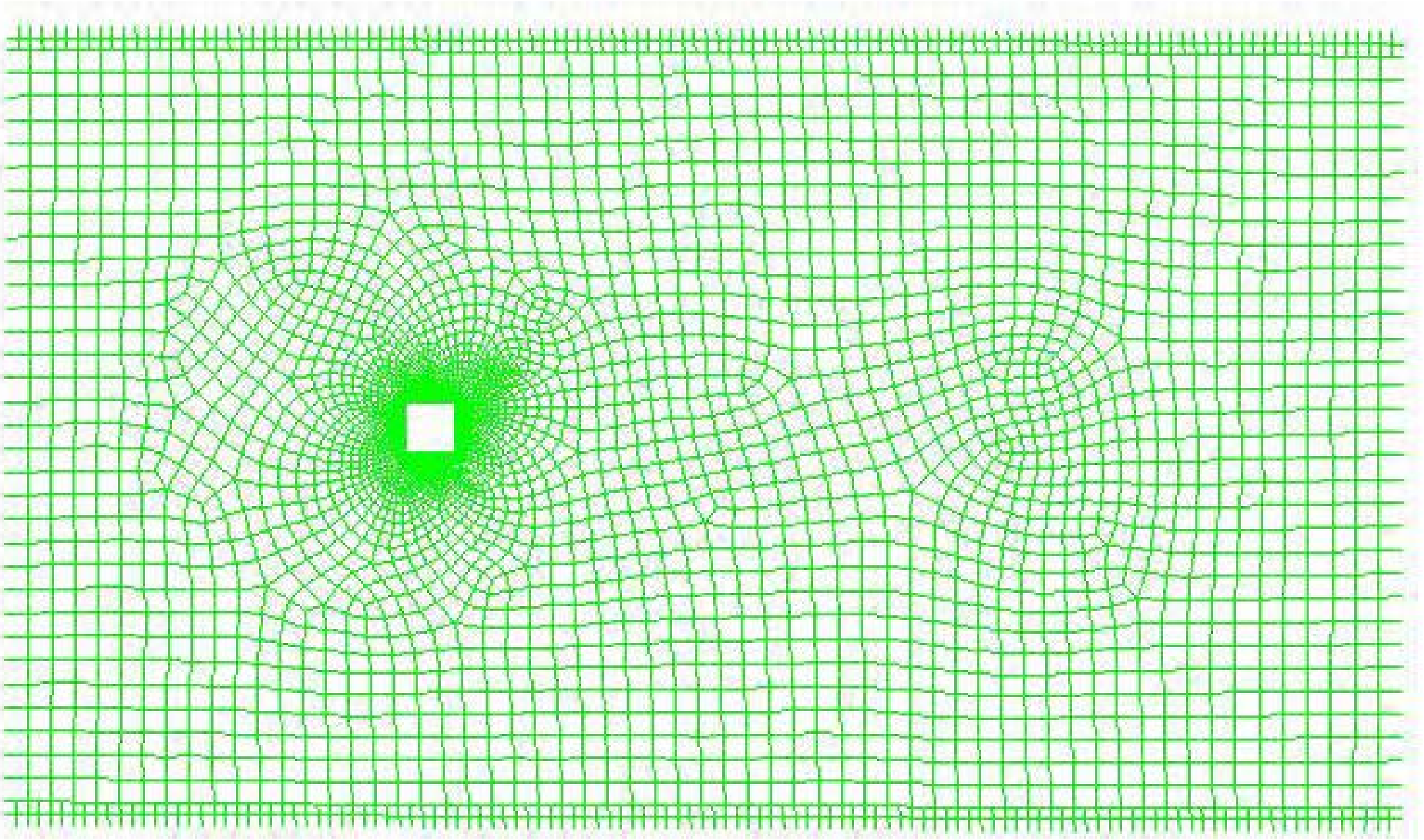
Inconsistency! Scaling?

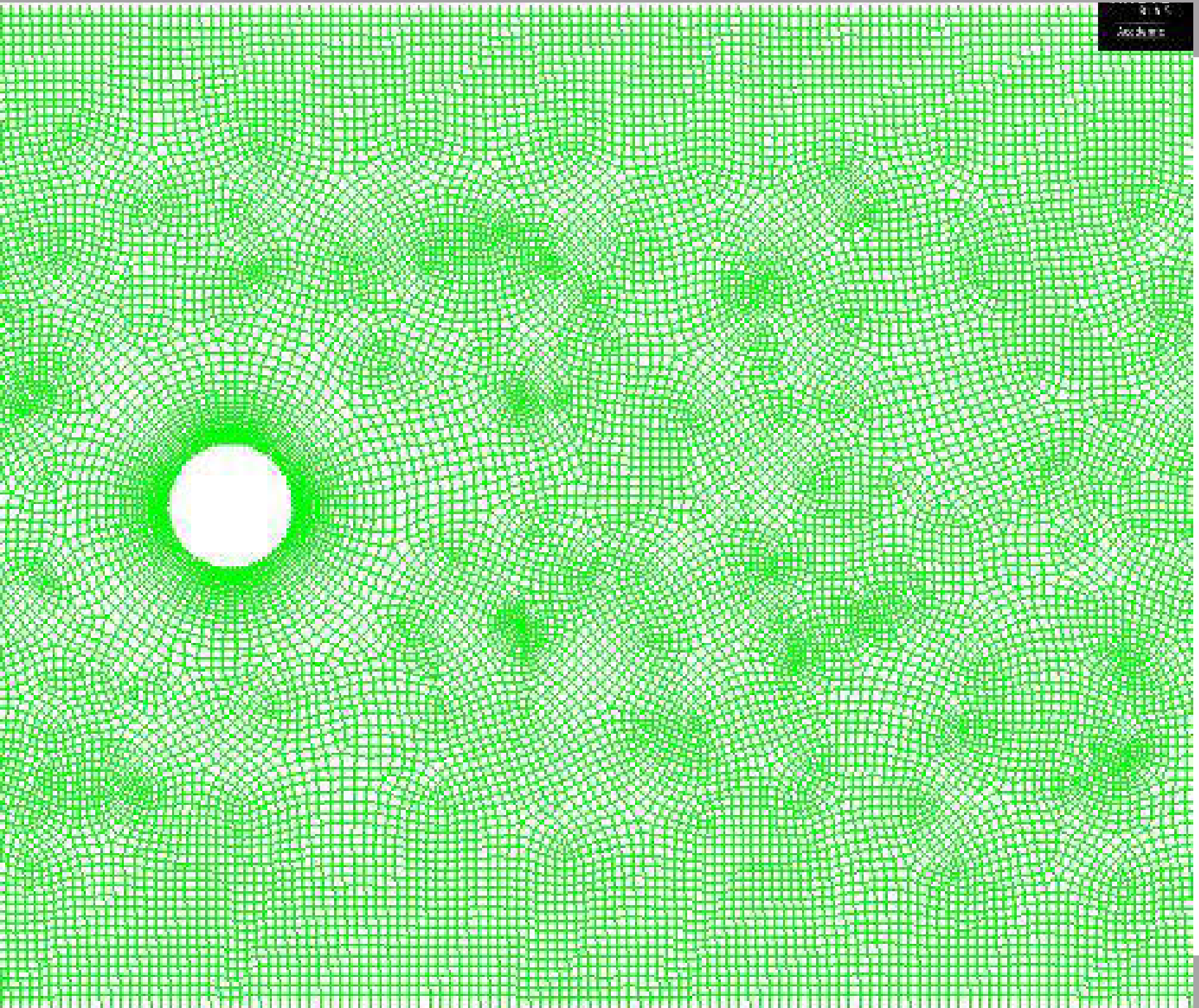


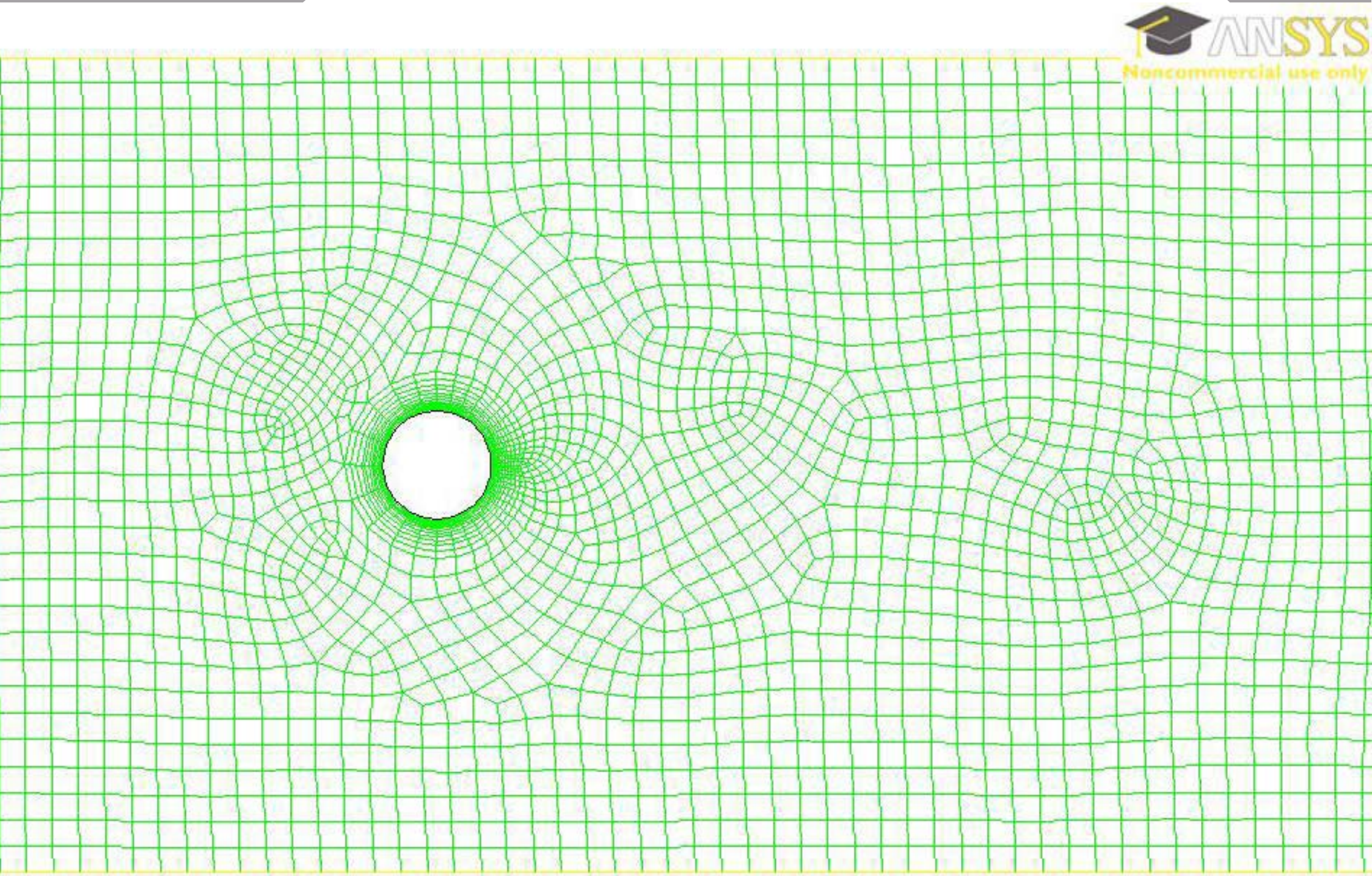
Grids

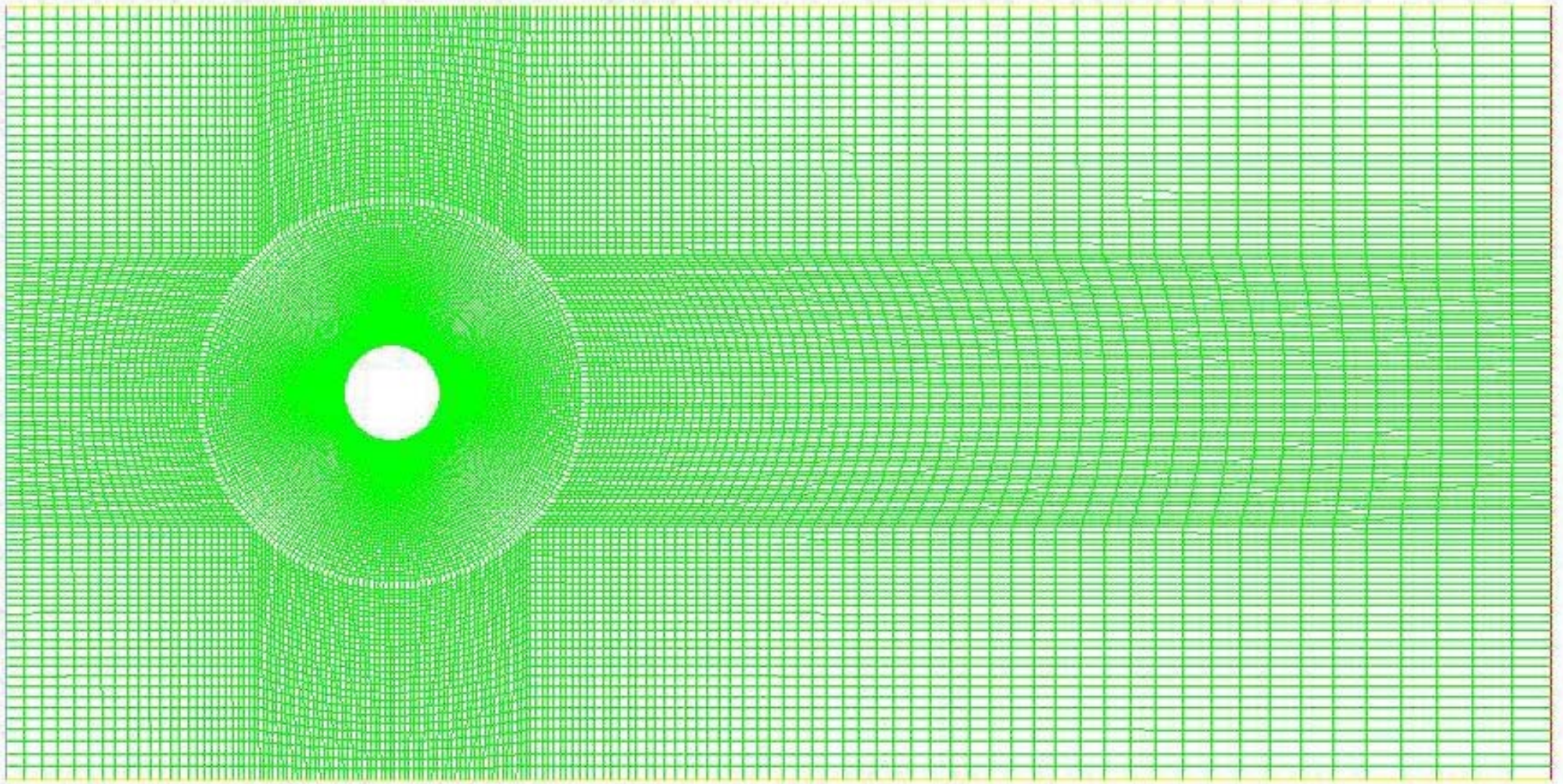

ANSYS
Noncommercial use only
0,000
2,500
5,000 (m)
1,250
3,750
Y
X

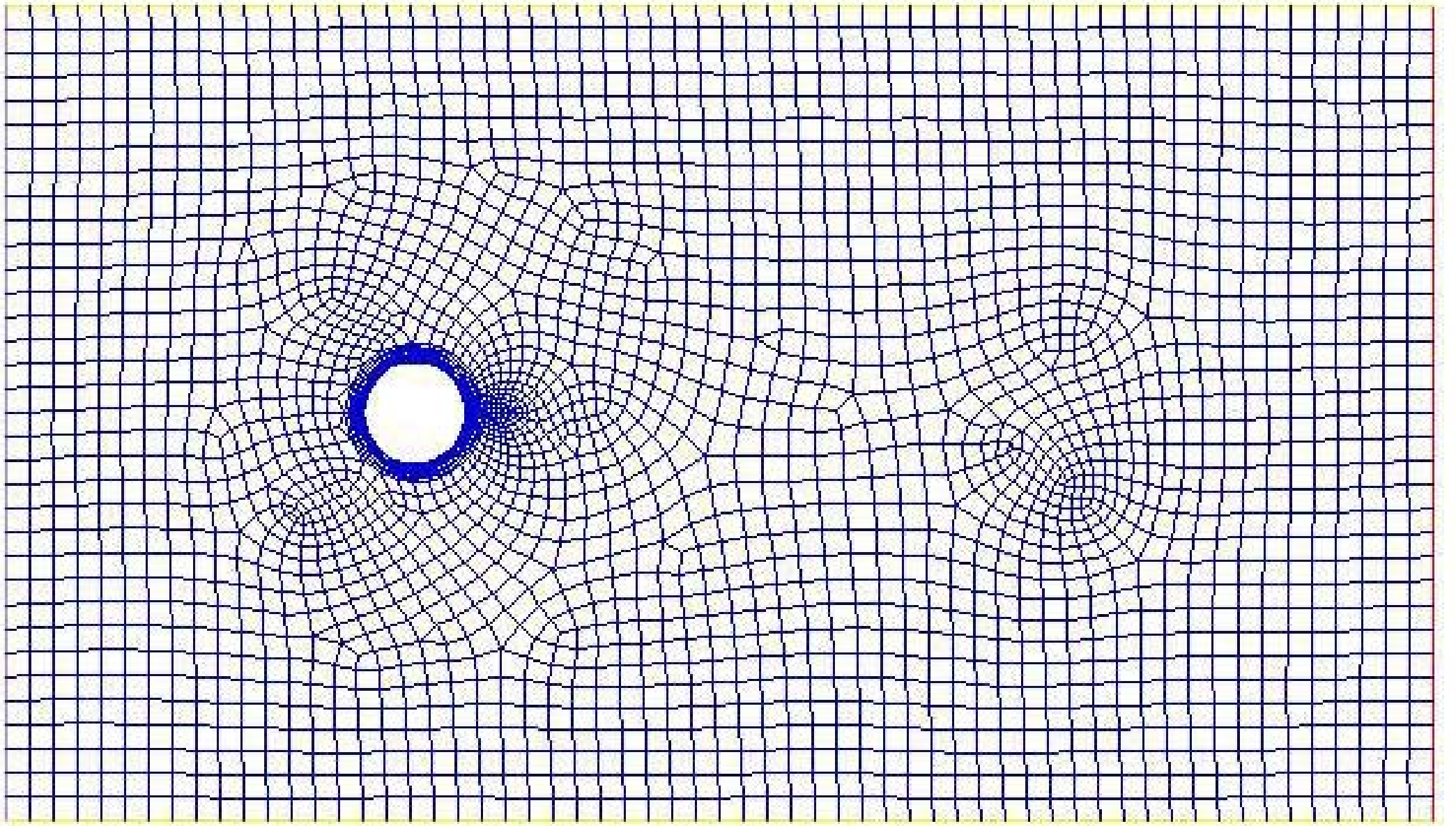

ANSYS
R14.5
Academic
Y
X
0.00
50.00
100.00 (mm)
25.00
75.00

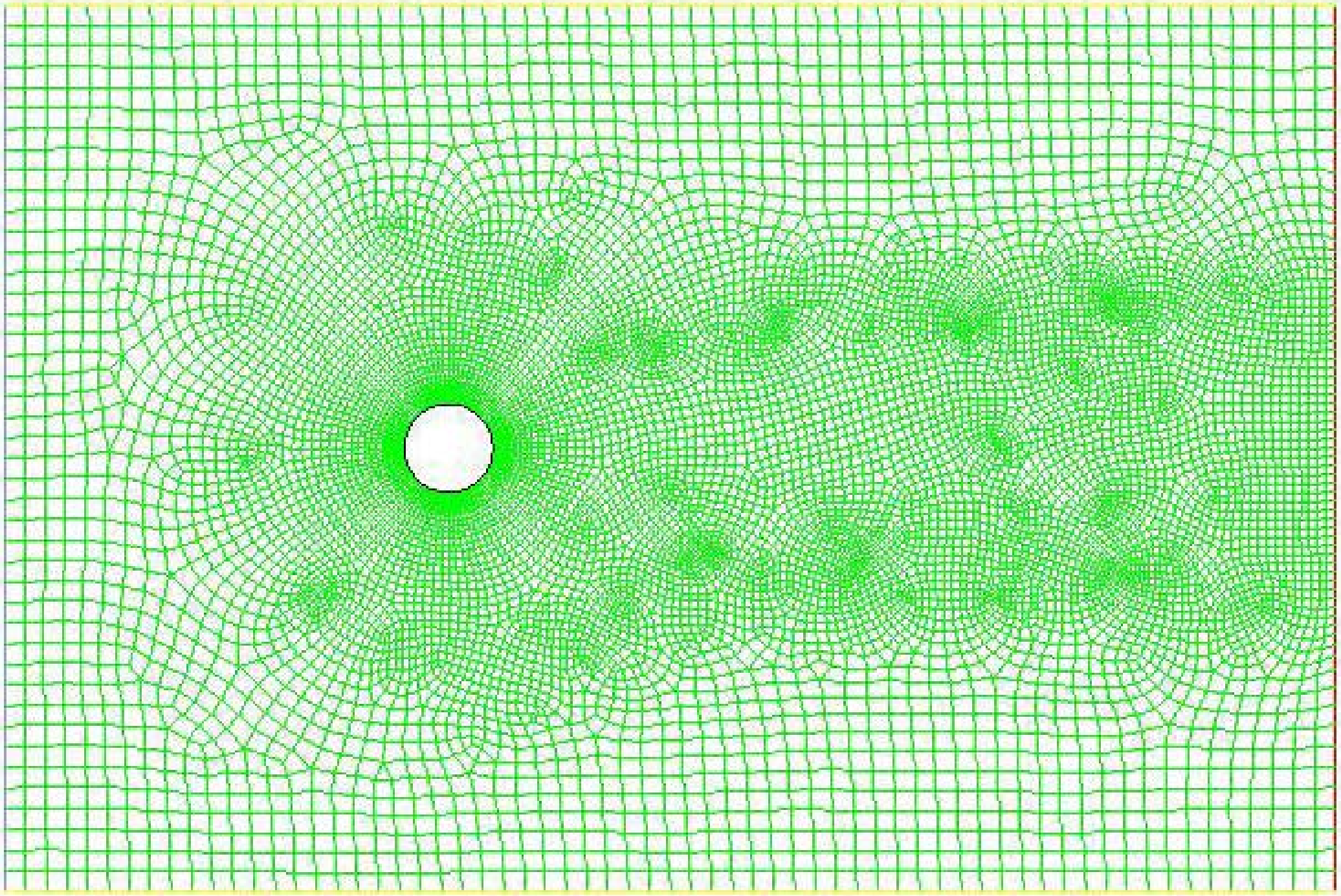


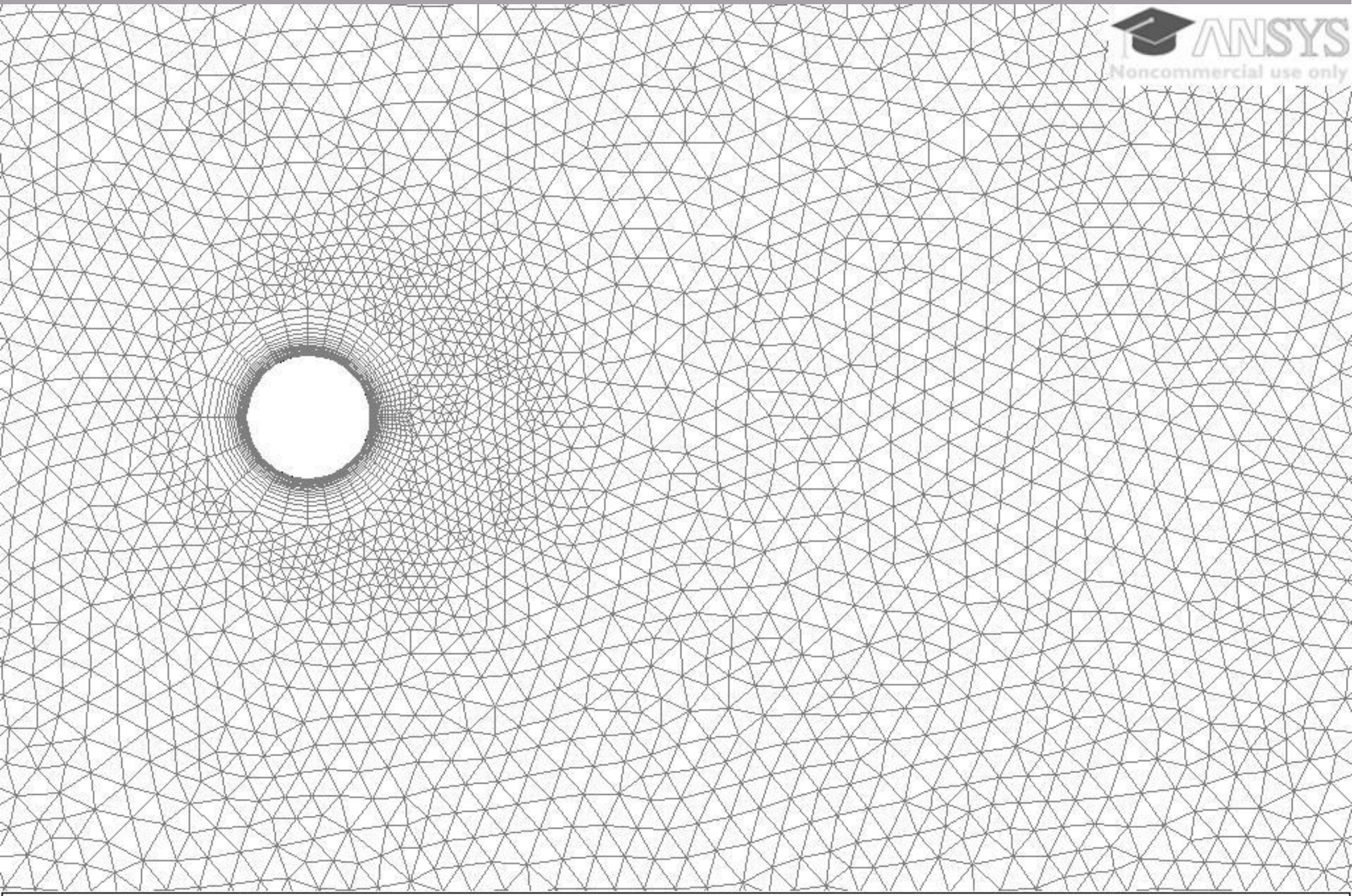


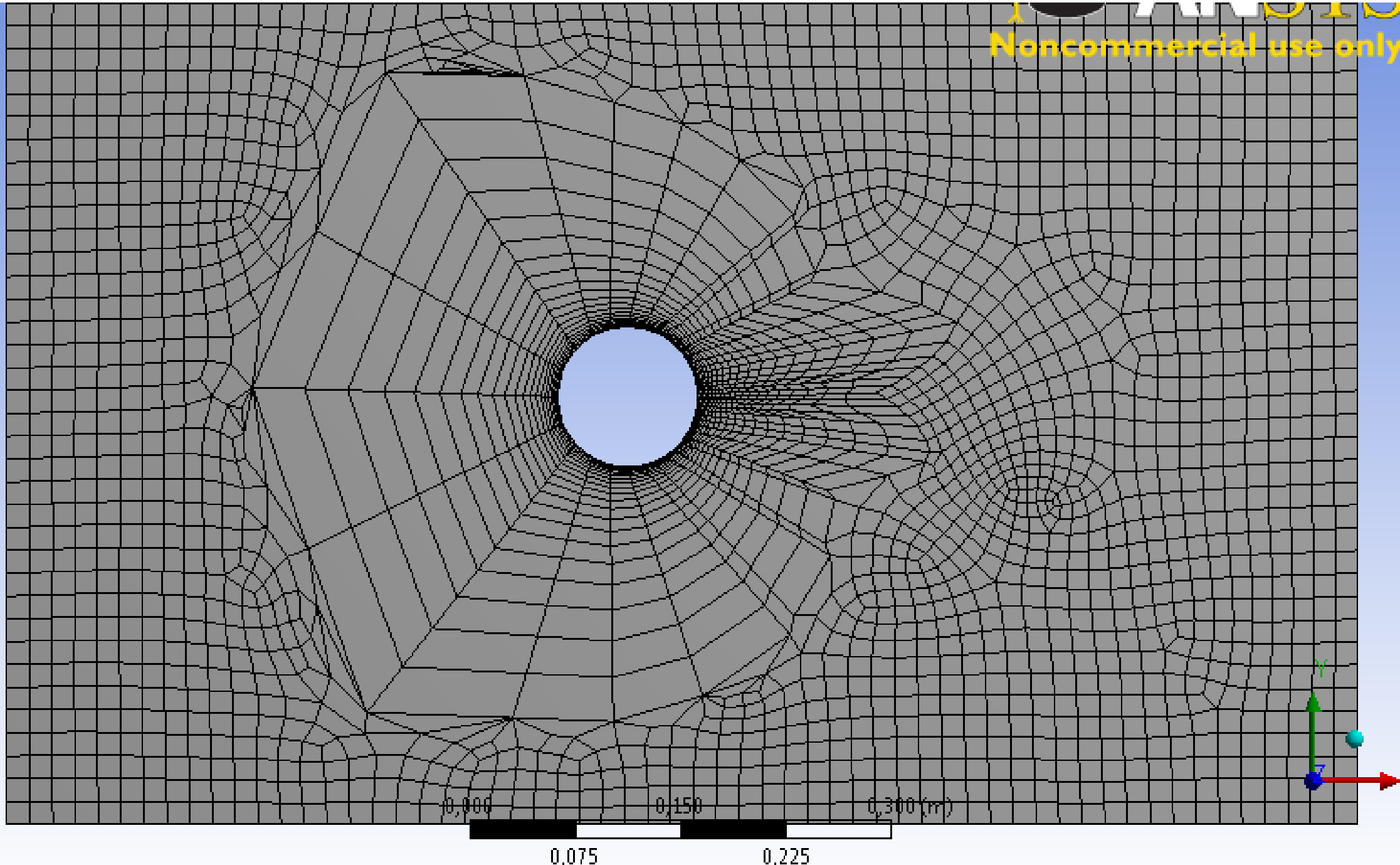


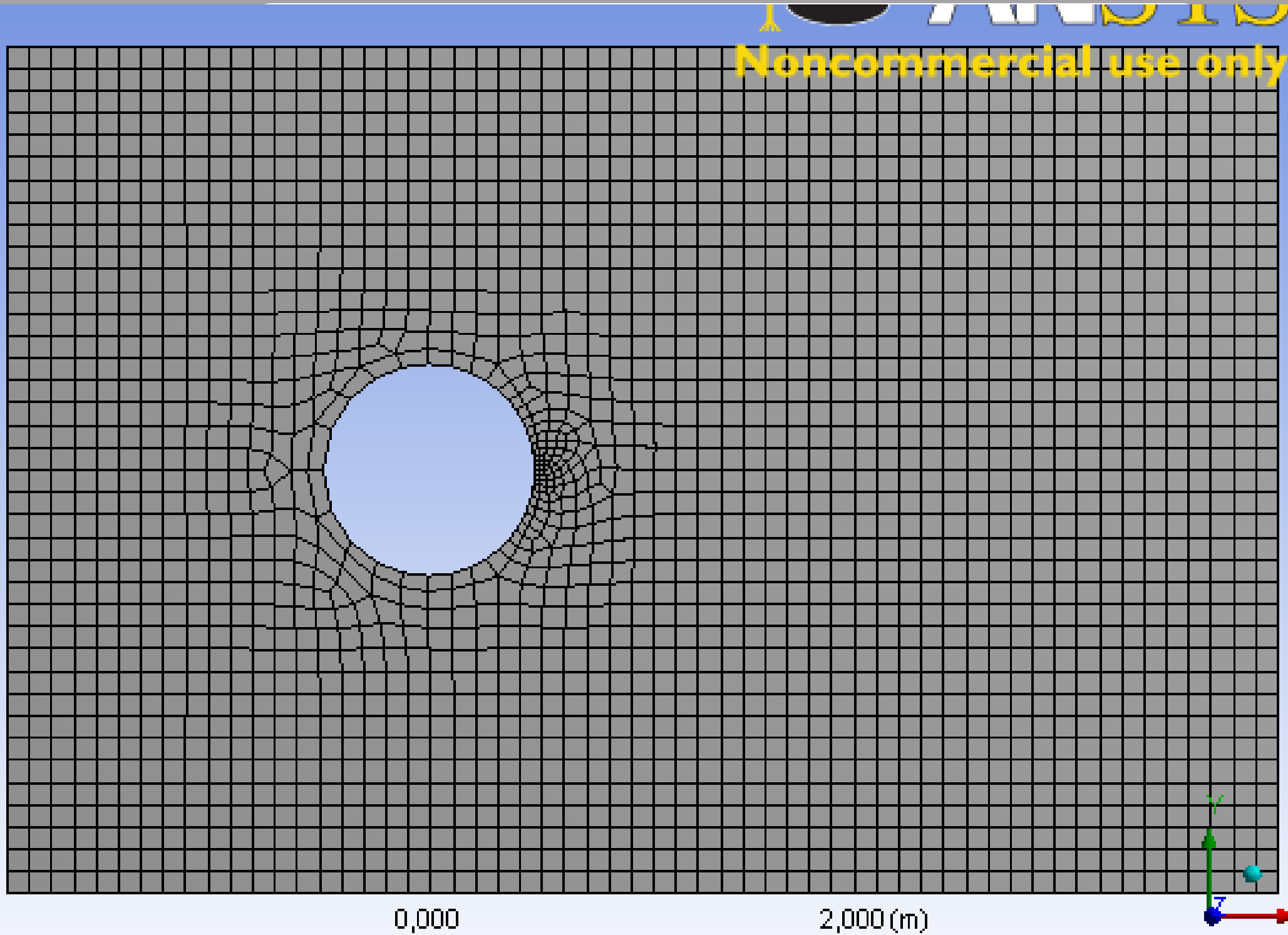









Noncommercial use only
0,000
0,150
0,300 (m)
0.075
0.225
Y
Z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2,000 (m)
Y
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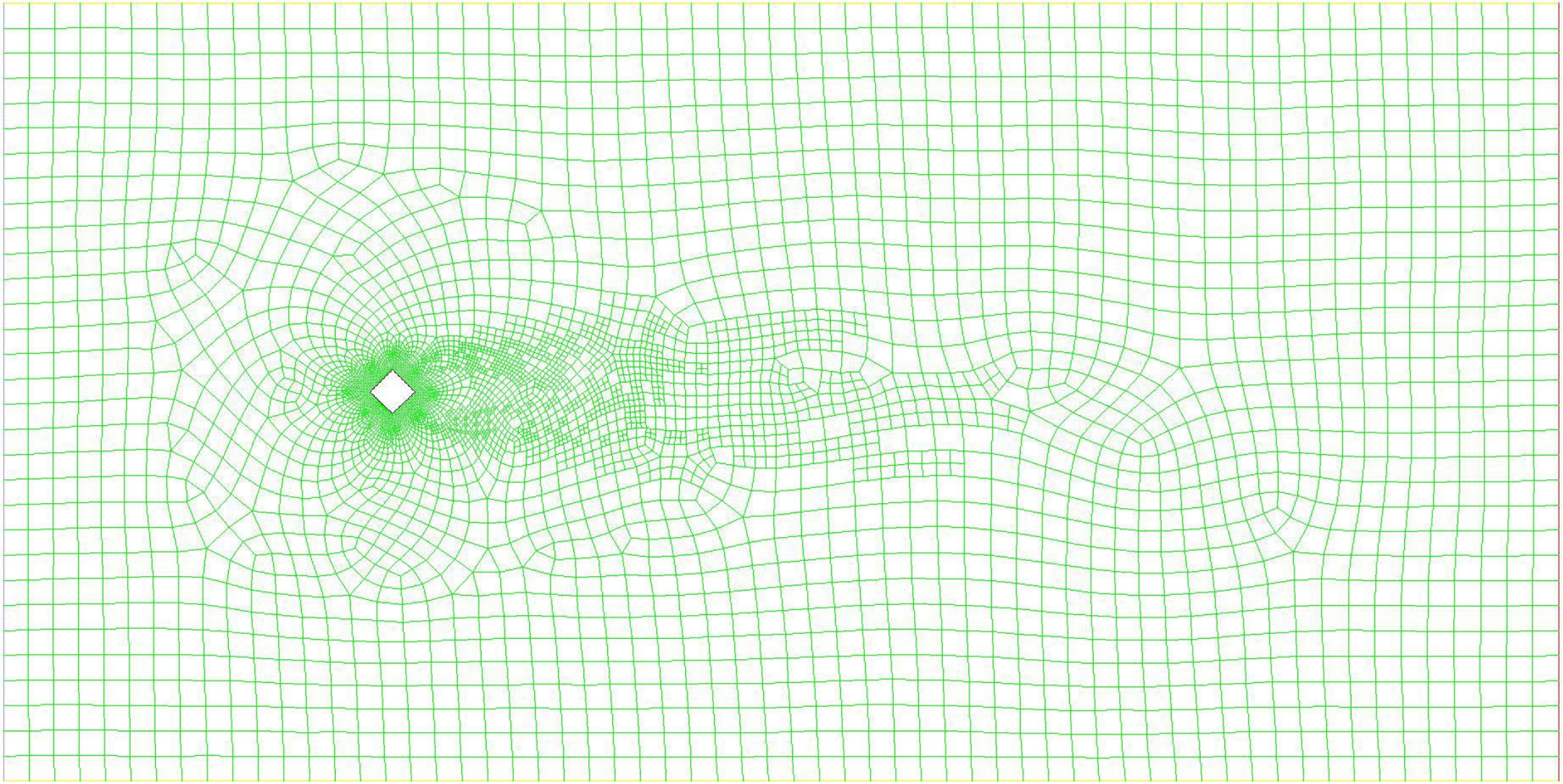
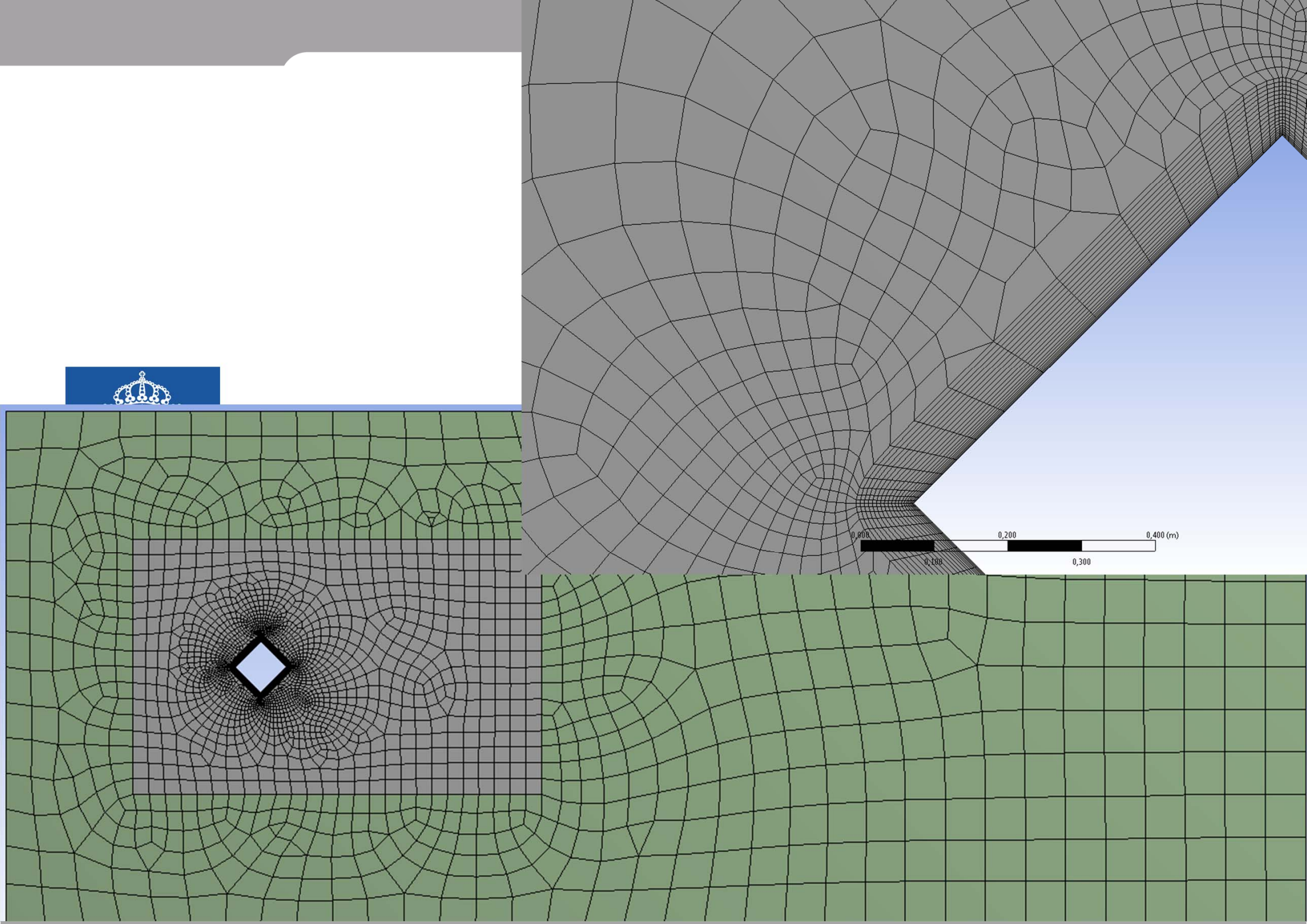

ANSYS
R14.5
Academic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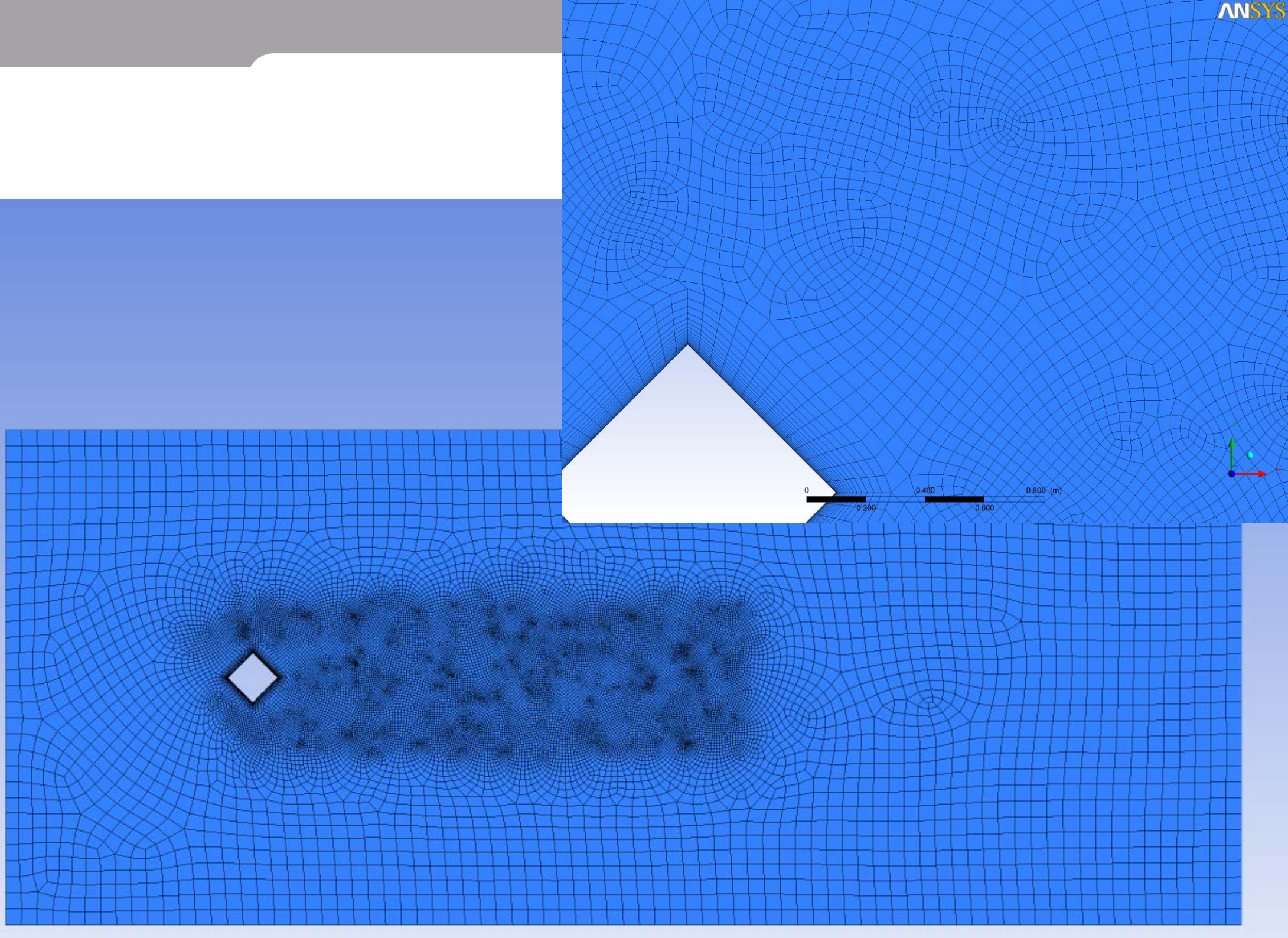
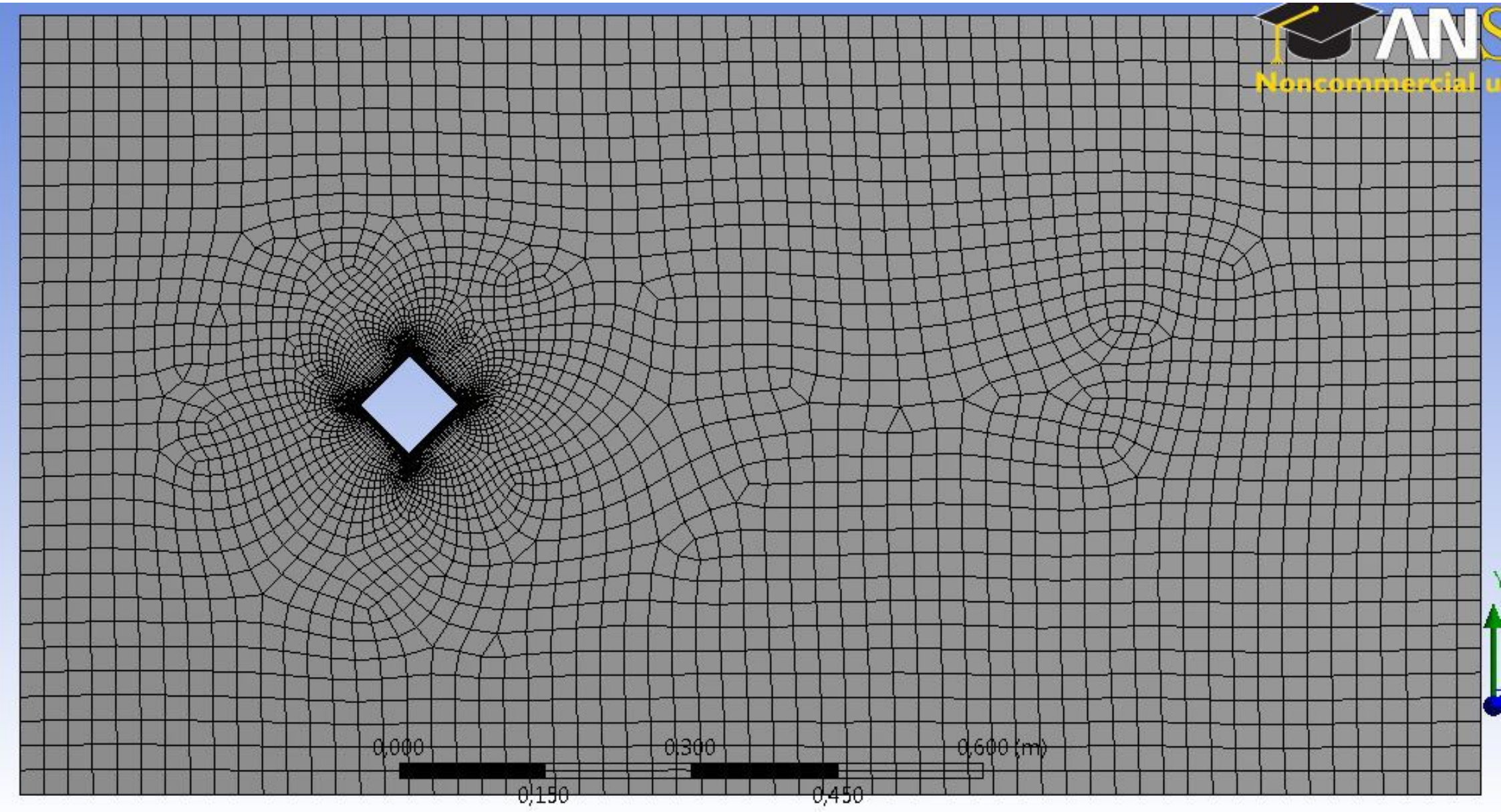
0,200
0,400 (m)
0,100
0,300


ANSYS
0
0.200
0.400
0.600
0.800 (m)


Noncommercial u
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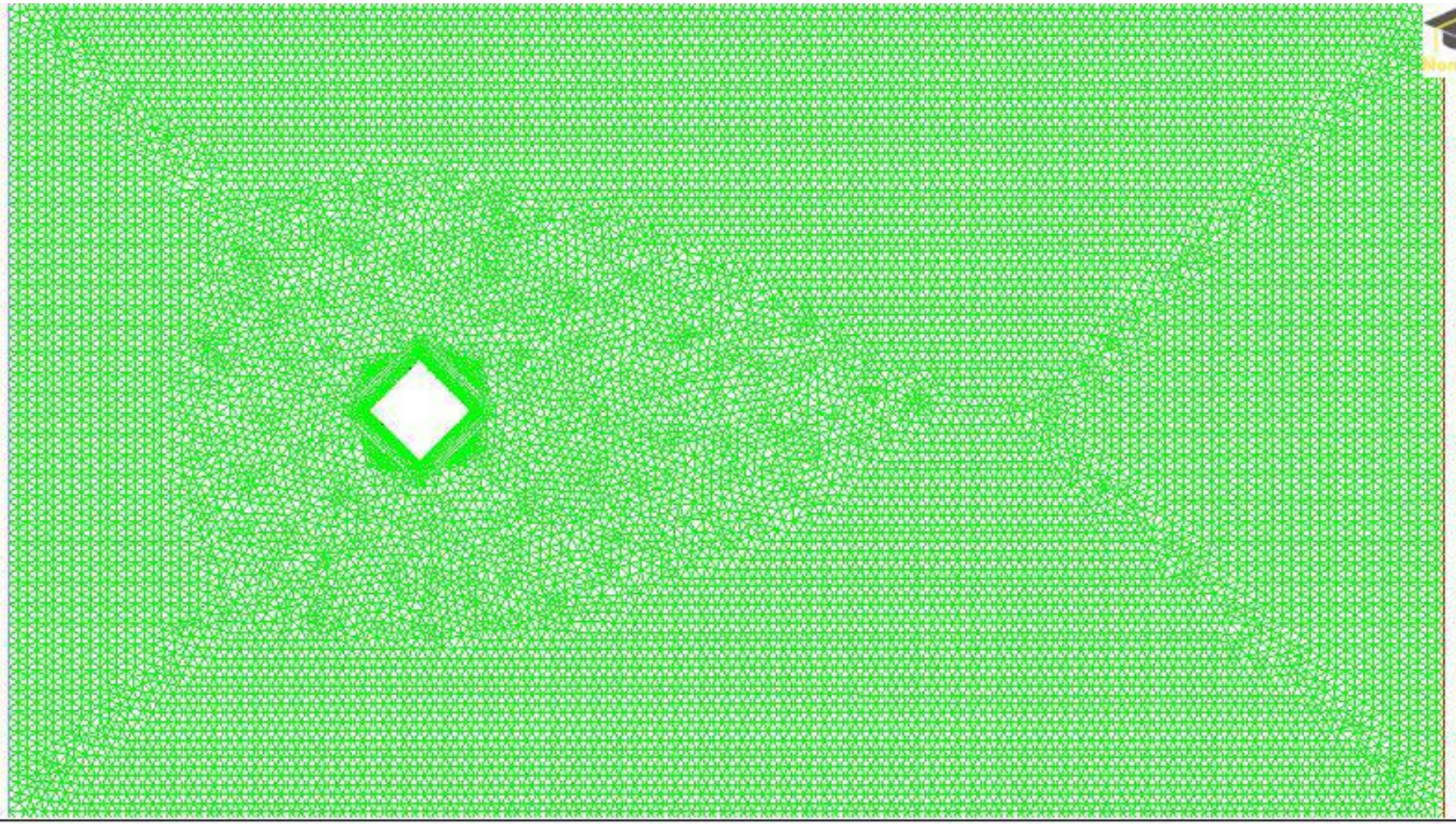
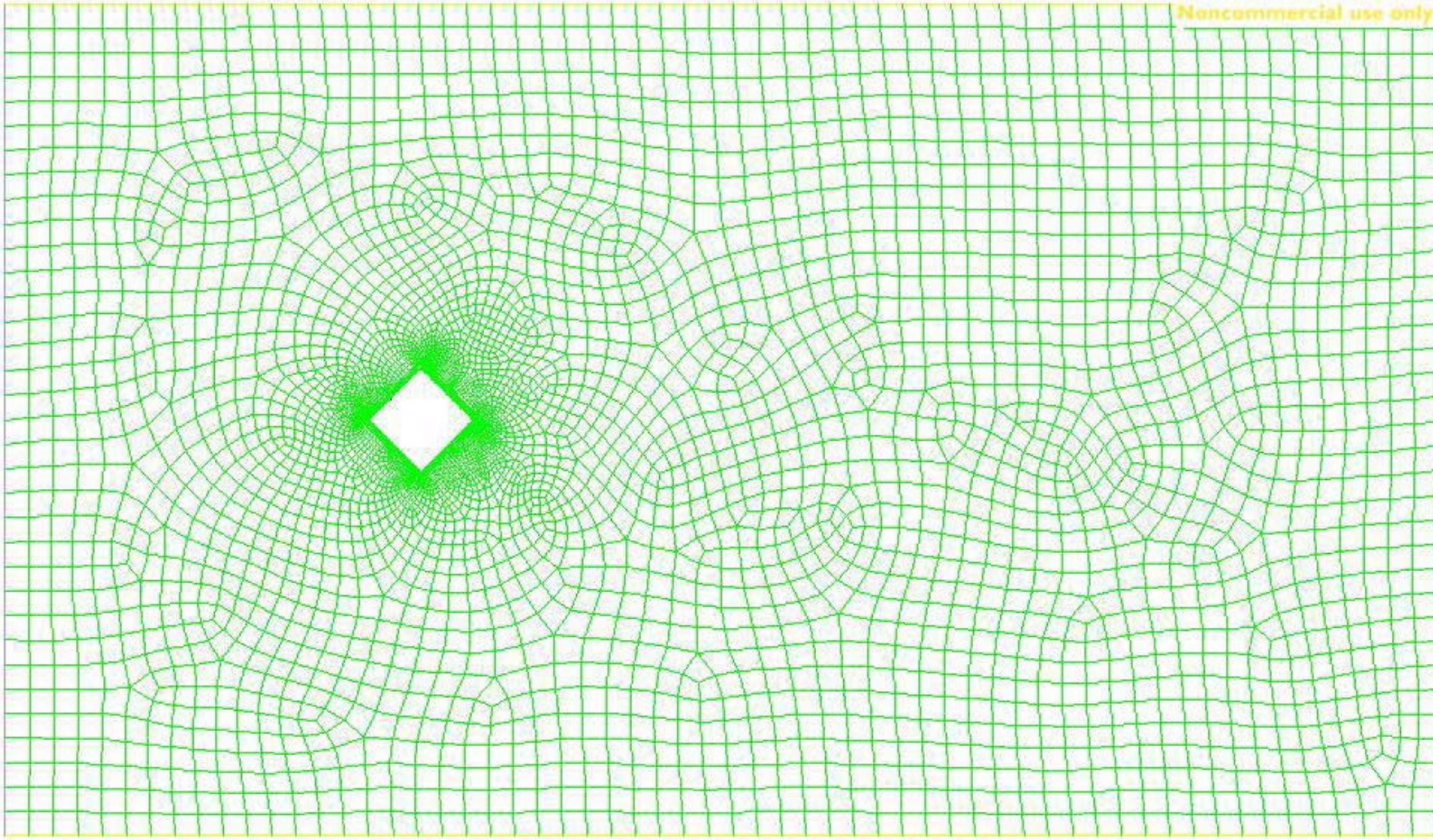
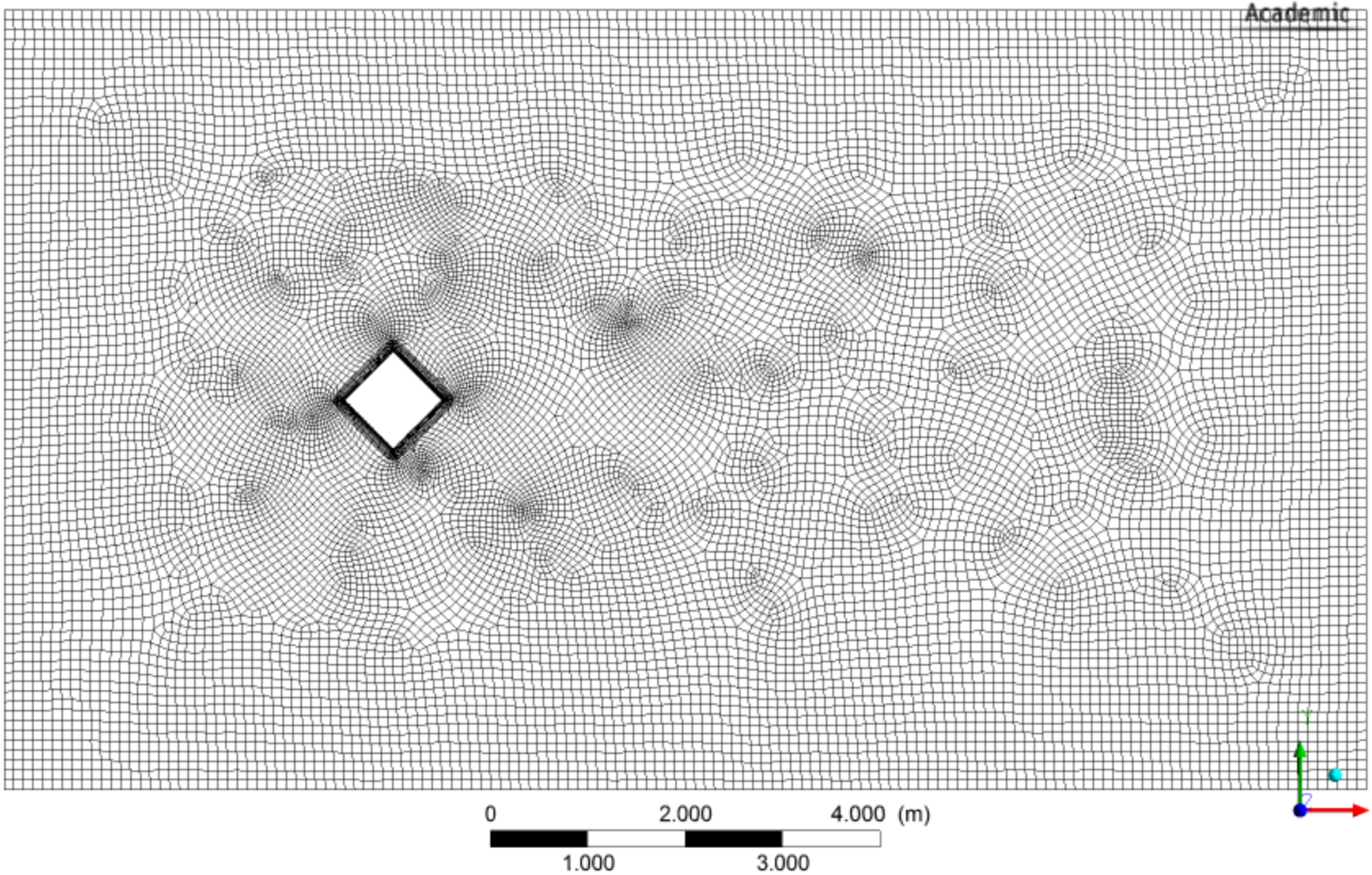
0,300
0,600 (m)
0,150
0,450

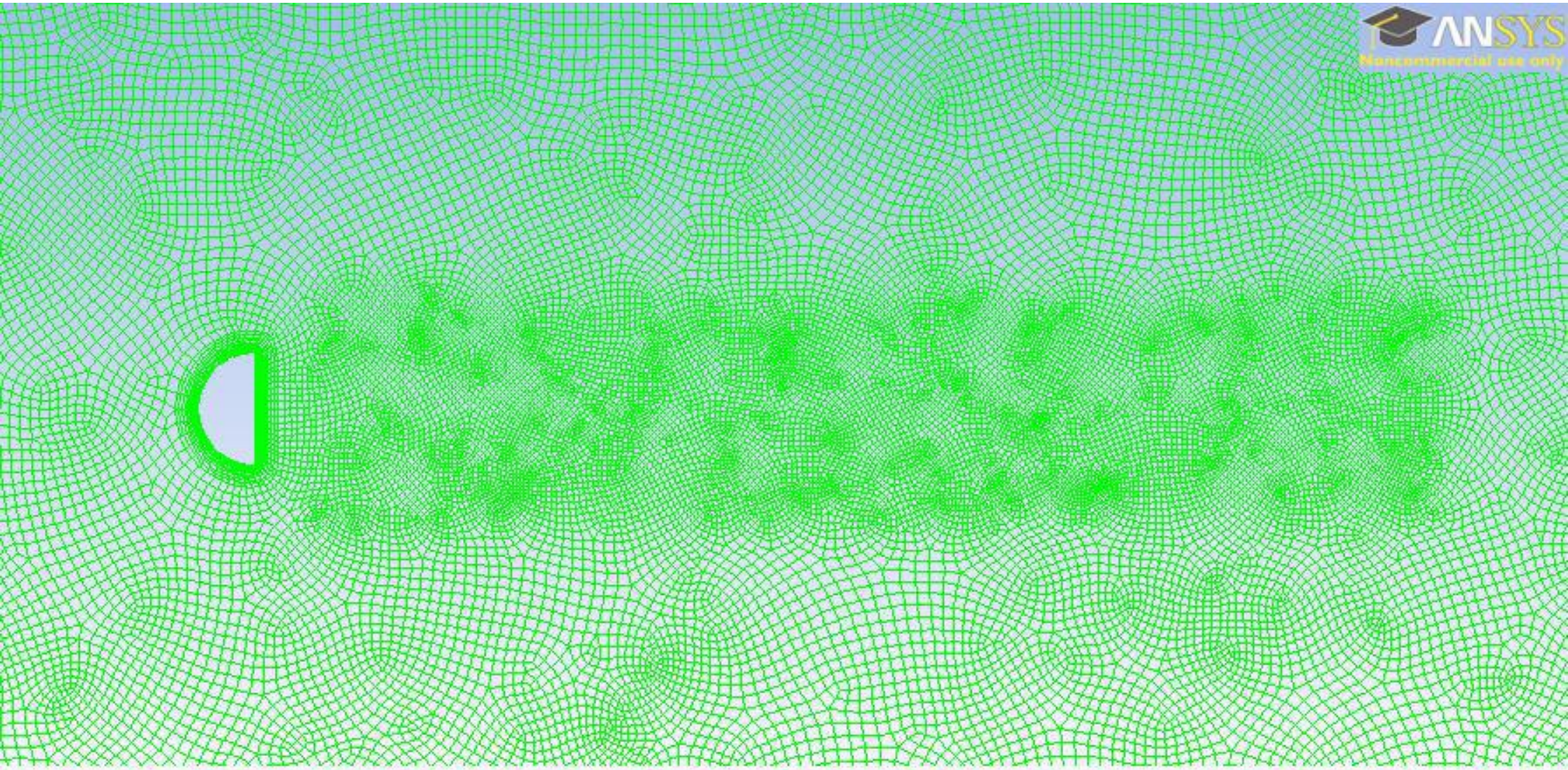


Mesh

Apr 17, 2013
ANSYS FLUENT 14.0 (2d, pbns, rke)




ANSYS
R14.5
Academic
0
2.000
4.000 (m)
1.000
3.000
Y
X



Mesh

Apr 18, 2013
ANSYS FLUENT 14.0 (2d, dp, pbns, rke)