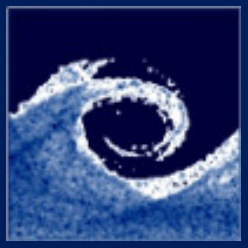
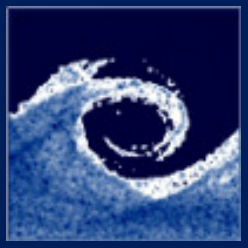
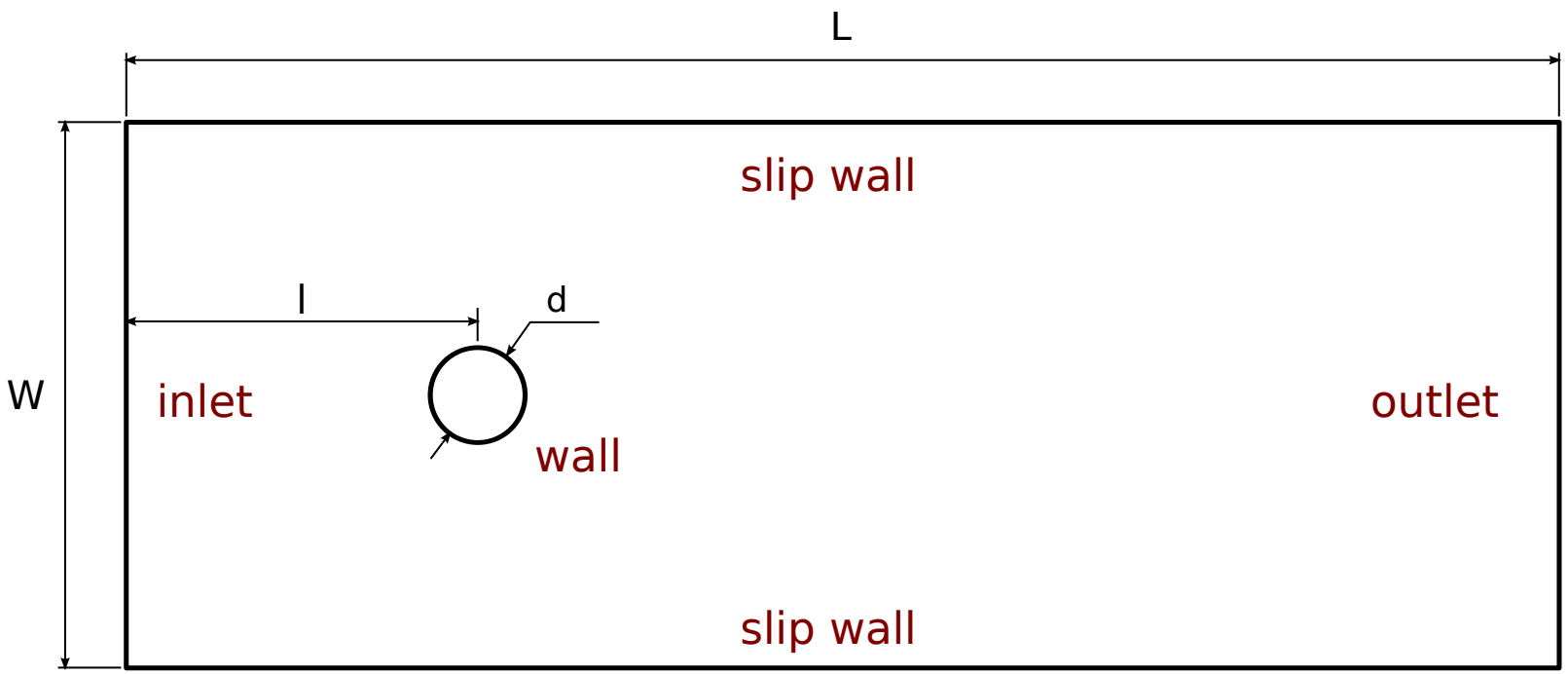


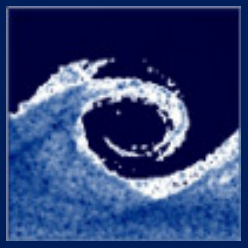
Laboratory tasks I.

1. Create the geometry and mesh for the vortex street simulation
   - Make a copy the cavity case with a new name (e.g. vonKarman)
   - Modify the mesh (blockMeshDict) according to the geometry (figures on the two next slides)
     - $L = 40m$, $W = 20m$, $l = 10m$, $d = 2m$
     - Interval numbers in x: $n_{xu} = 48$, $n_{xc} = 30$, $n_{xd} = 71$
     - Interval numbers in y: $n_{yb} = 48$, $n_{yc} = 30$, $n_{yt} = 48$
     - Interval grading in x: $g_{xu} = 0.1075$, $g_{xc} = 1$, $g_{xd} = 28$
     - Interval grading in y: $g_{yb} = 0.1075$, $g_{yc} = 1$, $g_{yt} = 9.3$
   - Create, check and visualize the mesh

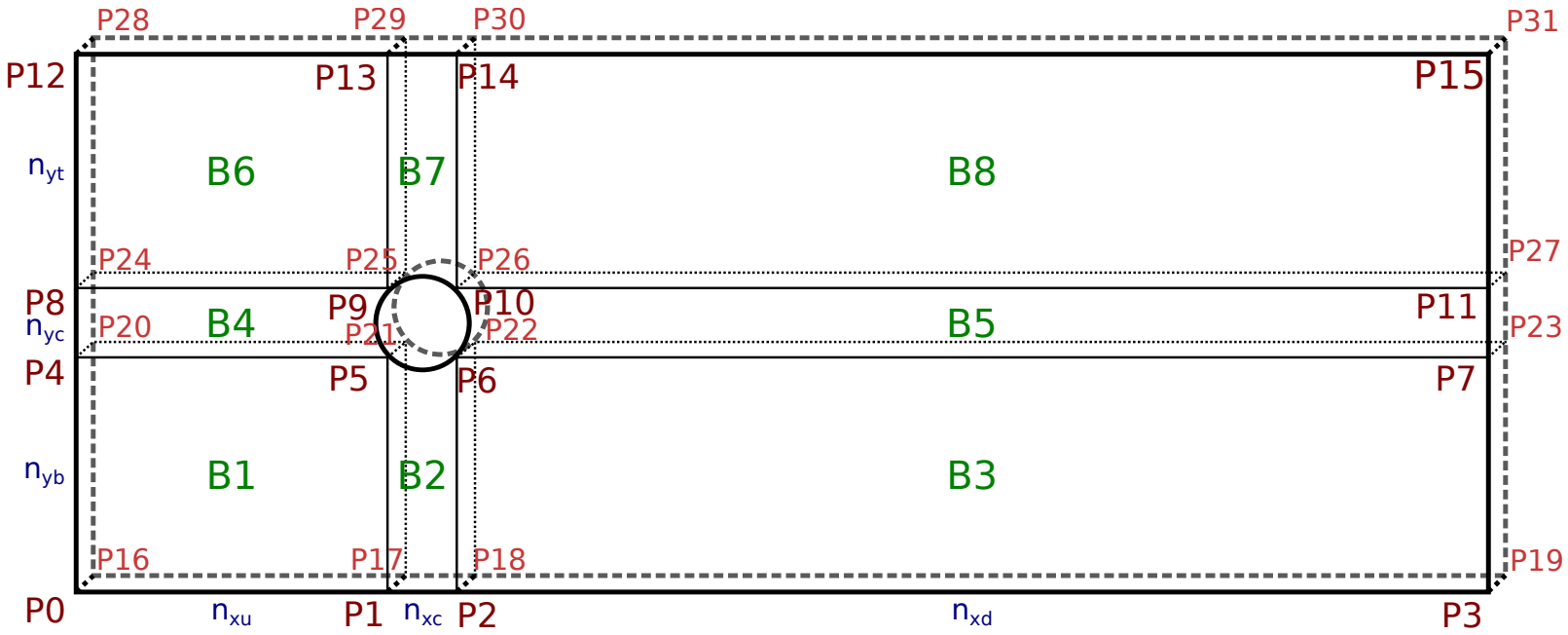


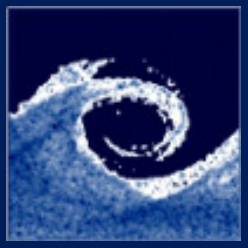
Laboratory tasks I. - Geometry





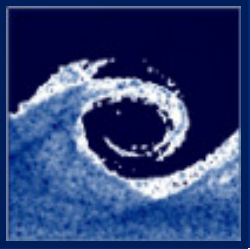
Laboratory tasks I. - Mesh blocks





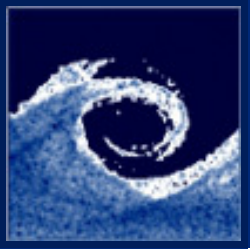
Laboratory tasks II.

2. Modify BC-s (0/U and 0/p) according to the geometry ($U = U_x = 1ms^{-1}$)
3. Modify the viscosity (in transportProperties), according to $Re = 400$
4. Modify system/contolDict (according to the CFL, $U_{max} = 2ms^{-1}$, $\Delta x_{min} = 0.045m$)
5. Modify system/fvSolution (solver smoothSolver to PBiCG, remove line: smoother symGaussSeidel, add line: preconditioner DILU,)
6. Run the simulation (using icoFoam, redirecting to a log, $t_{end} = 100s$)
7. Calculates vorticity and Courant number (commands: vorticity, Co)
8. Visualize the results (vorticity, Courant number, pressure, streamlines)



Assignments

1. What is the total volume of domain in the von Karman vortex street case?
2. Where should be positioned a line source of the streamlines for the best visual experience?
3. Why could not simpleFoam results a convergent solution for this problem?
4. How could you increase the Reynolds number? List 3 possibilities!
5. Which way could you improve the mesh? List 3 of them!



Homework

1. Create a refined O-grid (12 blocks) for the von Karman vortex street case, with
   - $L = 70$, $l = 20$, $d = 1$
   - Smaller cell expansion in the wake.
   - Fine surface mesh for the cylinder
2. Compare the results to the basic case