Subject: Hydrodynamics Simulation

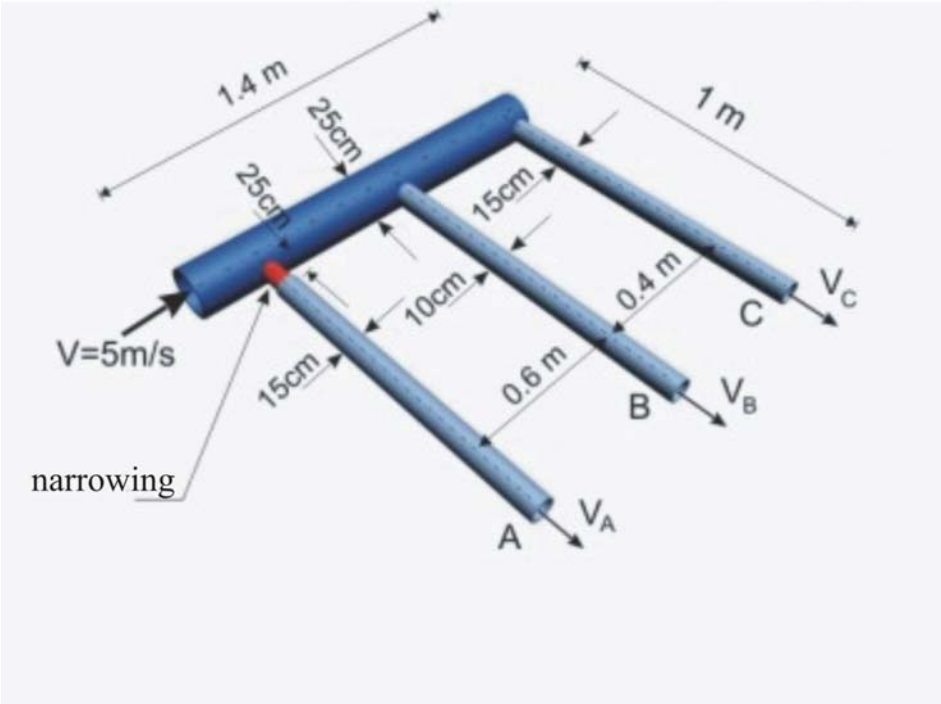

Fig.1

Assignment: Incompressible Newtonian fluid (density 1.1 g/cm^3) goes trough the inlet of the pipe system with velocity 5 m/s and is separated into the three branches A, B and C (fig.1). The flow into the branch A is controlled by constriction, varied from 100 mm (full opening) to 0 mm (full closing).

Determine the general dependence between the maximum of the fluid velocities V_A, V_B and V_C at the outlets and the constriction rate. Solve the problem in 3D formulation with three values of the kinematic viscosity: 1 mm^2/s, 1.2 mm^2/s and 1.5 mm^2/s.

Submit:

1. Geometrical model, including the mesh and the boundary conditions.
2. The stream lines during the full open constriction.
3. The pressure field during 50% closed constriction.
4. The velocity field during 100% closed constriction.
5. Drawing of the dependence between the maximum of the fluid velocities at the outlets, the constriction rate and the values of the viscosity.

Answer the next questions:

1. What does the term “incompressible fluid” mean and where it is treated in the solution?
2. What does the term “Newtonian fluid” mean and where it is treated in the solution?
3. What element type was used ?
4. What element options were used ?
5. What real constants were used ?
6. How many nodes and elements were created ?
7. What is the % error (SEPC) for your solution ?