Subject: Hydrodynamics Simulation

Assignment: Incompressible Newtonian fluid (density 1.1 g/cm^3) flows through the valve is controlled by distance *h* of the flap *A* (fig.1). The dimensions of the valve are: D=50 mm, *d*=60 mm, *a*=15 mm, *b*=90 mm, *c*= 70 mm. The fluid velocity at the inlet is 2 m/s.

Determine dependence of the mean velocity V_2 at the outlet, the distance *h* within the borders of 0-50 mm and the viscosity. Solve the problem in 2D formulation with three values of the kinematic viscosity: 1 mm^2/s, 1.2 mm^2/s and 1.5 mm^2/s.

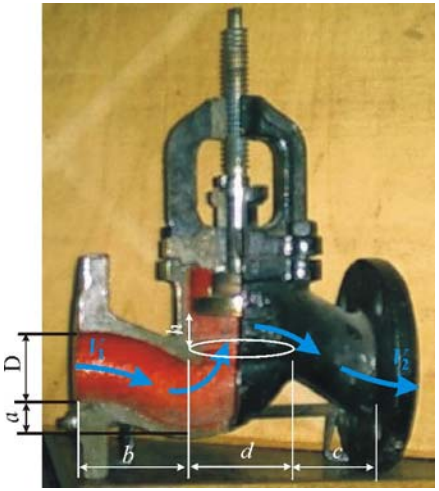

Fig. 1

Submit:

1. Geometrical model, including the mesh and the boundary conditions.
2. The stream lines when *h* = 15 mm.
3. The pressure field when *h* = 30 mm.
4. The velocity field when *h* = 45 mm.
5. Drawing of the dependence between the mean velocity V_2, the values of the *h* and 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 for your solution?