Final exam questions

Subject group name: **Fluid Mechanics elective – Unsteady Flows in Pipe Networks**

Neptun code: ZVEGEVGNW21

Credit points: 3

Subject in this subject group:

- **Unsteady Flows in Pipe Networks** (BMEGEVGNW21)

Program: Mechanical Engineering Modelling, MSc (2N-MW0)

Specialization: Fluid Mechanics

Responsible person:

Dr. Csaba Hős, cshos@hds.bme.hu
Department of Hydrodynamic Systems, Faculty of Mechanical Engineering

You can check the current subject forms at the Educational Portal of the Faculty of Mechanical Engineering.

https://oktatas.gpk.bme.hu/

Always check the for updates at edu.gpk.bme.hu before preparing for the exam, especially if the subject group contains at least one subject from your final semester!

Valid from 01 September 2021

Dr. Csaba Hős

associate professor

Unsteady Flows in Pipe Networks (BMEGEVGNW21)

1) MOC for slightly compressible fluids (constant sonic velocity)
   a) Internal point update
   b) Simple boundary conditions (pressure, velocity, total pressure)
   c) Pump as boundary condition: start-up and stop due to blackout.

2) MOC for open-surface flows
   a) Internal point update
   b) Simple boundary conditions (water level, velocity, flow rate).

3) Isentropic MOC
   a) Internal point update
   b) Simple boundary conditions (temperature, velocity, total temperature).

4) Lax-Wendroff scheme
   a) Main features, structure
   b) Boundary conditions implementation
   c) Comparison with isentropic MOC

5) Impedance technique
   a) Assumptions, theory behind (no derivation), aim of the technique (what kind of problems can be solved with it?).
   b) Boundary conditions.

6) Numerical techniques for
   a) solving systems of algebraic equations (Newton' technique)
   b) solving ODEs (explicit and implicit Euler, simple RK schemes) - stability, accuracy, stepsize selection