



Final exam questions

Subject group name: **Fluid Mechanics elective – Open Source Computational Fluid Dynamics**

Neptun code: ZVEGEÁTNW11

Credit points: 3

Subject in this subject group:

- **Open Source Computational Fluid Dynamics (BMEGEÁTNW11)**

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

Specialization: Fluid Mechanics

Responsible person:

- Dr. Miklós Balogh, baloghm@ara.bme.hu
Department of Fluid Mechanics, 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. Miklós Balogh

assistant professor

1. Introduction to OpenFOAM simulations (and linux, Gnuplot, Paraview): Basic linux commands, about OpenFOAM, case structure, main steps of the analysis.
2. Installation on several Linux distributions and virtual systems: Ubuntu, OpenSuse, Fedora from packages and on other systems from source.
3. Solution of simple fluid dynamics problems using OpenFOAM: problem statement, required folders and files, steps of the analysis, example cases (lid driven cavity: meshing, solving, domain and mesh modifications, post processing).
4. Detailed introduction to OpenFOAM software components I: pre-processing (meshing tools and utilities, initial and boundary conditions).
5. Detailed introduction to OpenFOAM software components II: solving (standard applications, user applications, probing and monitoring).
6. Detailed introduction to OpenFOAM software components III: post-processing (sampling, integrating, visualization with Gnuplot, ParaView).
7. Single phase stationary and transient flows, turbulence, compressible flows: Introduction to models, boundary conditions and solvers required for the simulation of these problems. Examples.
8. Multiphase and reactive flows: general principles of multiphase simulations (methods, e.g. VOF), chemical reactions, multiphase and reactive flow solvers, example problem (breaking of the dam).