Budapest University of Technology and Economics

Faculty of Mechanical Engineering

Department of Fluid Mechanics

http://www.ara.bme.hu/

FINAL PROJECT ASSIGNMENT

CLASSIFIED

<table>
<tr><td rowspan="6">Identification</td><td colspan="2">Name: Prasad Renju Kurian</td><td colspan="2">ID: 73359418042</td></tr>
<tr><td colspan="2">Code of the Curriculum: 2NAMW0</td><td>Specialisation:</td><td>Document ref. number:</td></tr>
<tr><td colspan="2">Curriculum: Master Program in Mechanical Engineering Modelling</td><td>2NAMW0-FM</td><td>GEÁT:2021-T:2NAMW0:PMP204</td></tr>
<tr><td colspan="2">Final Project issued by:
Department of Fluid Mechanics</td><td colspan="2">Final exam organised by:
Department of Fluid Mechanics</td></tr>
<tr><td colspan="4">Supervisor: Balázs Farkas (71421842963), senior lecturer</td></tr>
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<table>
<tr><td rowspan="3">Project Description</td><td>Title</td><td>Calculation of standard valve characteristics using CFD model with overset mesh interfaces
Általános szabályzószelep karakteriszikájának meghatározása overset hálózási eljárást alkalmazó CFD modell segítségével</td></tr>
<tr><td>Details</td><td>1. Literature search on the different types of control valves for single phase flows.
2. Overview of the standardized characterization of control valves based on EN 60534 industry standard for example. Differences in the standard performance characterization of incompressible and com-pressible flow valves.
3. Overview of CFD calculation of fluid flow in valves. Different type of losses inside the control valve and the requirement on the CFD calculation in order to be able to accurately capture the physics.
4. Identify challenges of CFD calculation of standard valve parameters (Cv,Xt).
5. Define a CFD setup used for calculating the valve characteristics based on the standard measurement procedure.
6. Create the CFD model without mesh interfaces for the simplified rotatory disk valve, and linear type valve geometry provided by Flowserve.
7. Create the CFD model for the same geometries with overset mesh interfaces.
8. Compare the two different modeling approaches in the 5-100% opening range, for both compressible and incompressible valve characterization.
9. Investigate the flow features and physics phenomenon by visualizing the flow of the different geometries at two different opening positions.
10. Create the summary of the findings, emphasize the pros and cons of the different work-flow and also the accuracy of the different CFD approaches in terms of standard valve characteristics
11. Summarize the work in the required document format of the MSc Thesis!</td></tr>
<tr><td>Advisor</td><td>Advisor's Affiliation:
    FlowServe Hungary Services Kft.
    1097 Budapest, Gubacsi út 6B.
Advisor: Péter Tóth, simulation engineer</td></tr>
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<tr><td rowspan="3">Final Exam</td><td>1st subject (group)</td><td>2nd subject (group)</td><td>3rd subject (group)</td><td>4th subject (group)</td></tr>
<tr><td>ZVEGEÁTMW02
Computational Fluid Dynamics</td><td>ZVEGEÁTMW03
Flow Measurements</td><td>ZVEGEÁTMW08
Building Aerodynamics</td><td>ZVEGEÁTMW19
Aerodynamics and Its Application for Vehicles</td></tr>
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<tr><td rowspan="4">Authentication</td><td colspan="2">Handed out: 8 February 2021</td><td colspan="2">Deadline: 14 May 2021</td></tr>
<tr><td colspan="2">Compiled by:
Balázs Farkas (71421842963)
Supervisor</td><td>Verified by:
Dr. János Vad (signed)
Head of Department</td><td>Approved by:
Dr. Péter Bihari (signed)
Vice-Dean</td></tr>
<tr><td colspan="3">The undersigned declares that all prerequisites of the Final Project have been fully accomplished. Otherwise, the present assignment for the Final Project is to be considered invalid.

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Prasad Renju Kurian</td><td colspan="2"></td></tr>
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