Budapest University of Technology and Economics
Faculty of Mechanical Engineering
Department of Fluid Mechanics
http://www.ara.bme.hu/

FINAL PROJECT ASSIGNMENT

Publicly Available

Identification

Name: **Kohajda Ádám István**			ID: **72166946074**
Code of the Curriculum: 2N-MW0		Specialisation:	Document ref. number:
Curriculum:	Master Program in Mechanical Engineering Modelling	2N-MW0-FM	GEÁT:2024-1:2N-MW0:NCI56G
Final Project issued by: Department of Fluid Mechanics		Final exam organised by: Department of Fluid Mechanics	
Supervisor:	Dr. Istók Balázs (72856166168), assistant professor		

Project Description

Title	**Influence analysis of simulation input data of inflators in airbag simulations** Gázgenerátor szimulációs bemeneti adatainak hatáselemzése légzsákszimulációkban
Details	1) Review of the literature on airbag flow modelling. 2) Review of the literature on the flow of gases from pressure vessels to learn about modelling inflators. 3) Analytical calculation of the noble gas flow behaviour out of a pressure vessel. 4) Familiarisation with the LS-Dyna software. 5) Modelling and calculation of point 3 using the LS-Dyna software. 6) Investigation of the gas flow behaviour from an inflator into a tank. 7) Selection of appropriate boundary conditions of the inlet flow to obtain the pressure curve observed in point 6. 8) Simulation of the outflow with another polyatomic gas. 9) Simulation of airbag deployment with the inflator data used in point 8 using 3 different modelling methods a. Uniform Pressure (LS-Dyna / AIRBAG Hybrid) b. Kinetic gas theory (LS-Dyna / CPM) c. Finite Volume Methods (LS-Dyna / ALE) 10) Results evaluation: characterisation of each method during the airbag deployment depending on the calculated inflator data (temperature, mass flow rate). 11) Comparison of the data obtained with results from practical experiments. 12) Summarisation of the work in the required document format of the MSc Thesis.
Advisor	Advisor's Affiliation: BMW Group Forschungs- und Innovationszentrum (FIZ); D-80788 München, Knorrstraße 147. Advisor: Dr. Doris RUCKDESCHEL, airbag simulation specialist

Final Exam

1st subject (group)	2nd subject (group)	3rd subject (group)	4th subject (group)
ZVEGEÁTNW02 Computational Fluid Dynamics	**ZVEGEÁTNW03** Fluid Mechanics Measurements	**ZVEGEÁTNW08** Building and Environmental Aerodynamics	**ZVEGEÁTNW19** Vehicle Aerodynamics

Authentication

Handed out: 4 September 2023		Deadline: 8 December 2023
Compiled by: Dr. Istók Balázs (72856166168) Supervisor	Verified by: *Dr. János Vad* (signed) Head of Department	Approved by: *Dr. Gábor Györke* (signed) Vice-Dean

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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Kohajda Ádám István