

I. IDENTIFICATION DATA

Thesis title:	Mathematical Modelling of Solid-Liquid Flow in Open Channel
Author's name:	Joaquín Rodrigo Llanos Espinoza
Type of thesis :	master
Faculty/Institute:	Faculty of Civil Engineering (FCE)
Department:	Hydraulics and Hydrology
Thesis reviewer:	Prof. Dr. Ing. Václav Matoušek
Reviewer's department:	Hydraulics and Hydrology

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
<p>The knowledge and skills required to fulfill the assignment exceeded the standard level provided by the Master's program in WEE. The mathematical modeling of complex multiphase flow using CFD tools was anticipated to demand considerable additional effort and time. The assignment would have been considered extraordinarily challenging if the expected result had been a fully developed mathematical model. Instead, the objective was to conduct preliminary testing of the capabilities and limitations of the available academic version of ANSYS Fluent in modeling a specific type of solid-liquid flow in a laboratory flume.</p>	

Fulfilment of assignment	fulfilled
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
<p>The student put incredible effort into fulfilling the task and was able to set up and test many configurations of the Fluent-based mathematical model. Keeping in mind that the preliminary testing of the ANSYS applications for the purposes of the open-channel flow with intense transport of sediment was the assigned task, the student collected and analyzed a large amount of information in a short period of time (one semester) and with quite limited hardware available for the project. Given the circumstances, the assigned task was fulfilled with a great margin.</p>	

Activity and independence when creating final thesis	A - excellent.
<i>Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.</i>	
<p>As described above, the student demonstrated enthusiasm and a proactive approach throughout his work. Although he frequently consulted with his supervisor, he also worked independently on many occasions, using his sound engineering judgment to make important decisions during the process. It is important to emphasize that the student was also able to critically evaluate the obtained simulation results.</p>	

Technical level	A - excellent.
<i>Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?</i>	
<p>The procedure and process of the preliminary testing of the ANSYS applications are described properly, and the explanation is technically sound, although the applied methodology would benefit from more careful treatment. The studied abilities of the applications are demonstrated well, but the experienced limitations of the applications – which are also valuable results of the work – are less emphasized. The student fully exploited his previously acquired skills in CFD modeling and further developed them during this thesis project. He successfully employed his expertise in advanced hydraulics gained in the Master's programme.</p>	

Formal level and language level, scope of thesis**B - very good.**

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

The thesis reads well; its language is clear, and the text is easy to understand. However, the objectives and the chosen approach to the work could be better communicated to ensure that the expected results and conclusions are more clearly understood.

Selection of sources, citation correctness**B - very good.**

Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?

The number of literature resources on ANSYS Fluent modeling of this particular type of solid-liquid flow in an open channel is quite limited. However, papers are available on simulations of flows of the same type of bimodal sediment using the same simulation techniques in pressurized pipes. The student referred to these papers, but more discussion and comparison with his studied flow would be useful. Additionally, a survey of literature on modeling open-channel solid-liquid flows using similar, though not identical, simulation techniques would contribute to a more complete picture of the state of the art.

Additional commentary and evaluation (optional)

Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

The grade that I award for the thesis is **A - excellent**.

Date: **16.6.2024**

Signature: