

I. IDENTIFICATION DATA

Thesis title:	Experimental and numerical analysis of cocchiopesto mortar under mixed mode of fracture
Author's name:	Maurício Sampaio Bonatte
Type of thesis :	master
Faculty/Institute:	Faculty of Civil Engineering (FCE)
Department:	Department of Mechanics / ITAM CAS
Thesis reviewer:	Fernando Suárez Guerra
Reviewer's department:	Department of Mining and Mechanical Engineering (Univ. of Jaén, Spain)

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	extraordinarily challenging
<i>How demanding was the assigned project?</i>	
This is the first Master Thesis of this Master Course that I review, so it is difficult for me to calibrate this without having other thesis to compare with, but I have found this work very challenging. This work proves that the student has acquired deep knowledge in very specific issues of Fracture Mechanics, not only understanding the specific theory and experimental background, but especially developing remarkable capacities in the field of data processing (DIC) and numerical analysis (finite element models using OOFEM).	

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>	
In my opinion, the assigned task has been very well covered by the works described in the document. The student has correctly carried out the experimental analysis and has developed a quite ambitious numerical analysis, proving that he understands and applies well some techniques that are fundamental (and not trivial) in this type of works, such as the analysis of the experimental data and the sensitivity analysis carried out in the numerical part of this work.	

Methodology	correct
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
I have found the experimental work correct and the numerical work particularly extense and well structured:	
<ul style="list-style-type: none"> ● Regarding the experimental work, although correct, I have found a bit odd the way the DIC data has been used. The conclusions are based on time-displacement diagrams using a high number of correlation points, when these conclusions could have been observed, probably in an easier way, using 2D colour mappings of several fields (displacements and strains, mainly). ● On the other hand, the numerical work has been particularly interesting, rigorous and well structured. The sensitivity analysis helps to understand why mode II fracture is usually hard to induce and the influence of each parameter is well treated, helping to clarify on this mode of fracture. Moreover, it provides a good guide to predict if a certain material can develop fracture under mode II conditions using the shear test employed here or it will finally develop fracture mainly under mode I. Very interesting. 	

Technical level	A - excellent.
<i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?</i>	
Reading the document, my impression is that the student has reached a high technical level. He proves to understand	

some hard and very specific issues of Fracture Mechanics and he exposes with clarity the main elements attached to this work.

The experimental part is well described and the numerical part especially well developed.

Formal 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?

Language use is correct and well used in the document. The main topics are covered with a logic structure, the document is well presented and the english language is also good and easy to read. Some minor issues have been found in some diagrams, such as Figures 54 and 55, where it is not clear which curves refer to the right support and which ones to the left support, or some figures a bit too large, like Figures 8 and 50. Apart from this small issues, the formal quality of the document is very good.

Selection of sources, citation correctness

A - excellent.

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 main issues covered in the introduction, such as Linear Elastic Fracture Mechanics or Size Effect, are referenced using very well selected references. The introduction is, in my opinion, particularly sound and provides a very good initial background to anyone interested in mixed-mode fracture and size-effect in quasi-brittle materials.

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

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

I have enjoyed reading this work. On one hand, my personal research interests are very much aligned with the work presented here and, on the other hand, the way this work has been carried out and the way it is presented in the document is particularly appealing for anyone interested in these topics.

Some questions that should be answered in the presentation of the work:

- The DIC data has been used to plot Displacement vs Time diagrams, Figures 39, 40 and 41. They allow understanding some mechanisms and tilting movements that take place during the test but, wouldn't it be easier to see these phenomena by plotting 2D colour mappings, which are usual outputs when using DIC?
- The sensitivity analysis carried out in the numerical part is very interesting. It shows that some variables of the test (geometrical and some material properties) make this test resulting in true mode II fracture instead of inducing an eventual mode I fracture. What recommendations could be made to help inducing a mode II fracture using this test according to your experience in the sensitivity analysis?

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



THESIS REVIEWER'S REPORT

Date: 23/July/2020

Signature: