

## I. IDENTIFICATION DATA

|                               |  |
|-------------------------------|--|
| <b>Thesis title:</b>          | Quantum Mechanical study of electronic properties of systems derived from transition metal dichalcogenides |
| <b>Author's name:</b>         | Marek Hulec  |
| <b>Type of thesis :</b>       | bachelor   |
| <b>Faculty/Institute:</b>     | Faculty of Electrical Engineering (FEE)  |
| <b>Department:</b>            | Control Engineering  |
| <b>Thesis reviewer:</b>       | Antonio Cammarata PhD  |
| <b>Reviewer's department:</b> | Control Engineering  |

## II. EVALUATION OF INDIVIDUAL CRITERIA

|   |                            |
|---|----------------------------|
| <b>Assignment</b>   | extraordinarily challengir |
| <i>How demanding was the assigned project?</i>  |                            |
| The candidate had to learn the fundamentals of Quantum Mechanics and their mathematical formalism; however, the candidate's academic courses did not cover such subjects but he managed to acquire the required knowledge showing extraordinary ability to quickly learn new theories and techniques. |                            |

|   |           |
|---|-----------|
| <b>Fulfilment of assignment</b>   | 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>   |           |
| The thesis had the aim to acquire the necessary knowledge to perform quantum mechanical simulations on solid state systems. The acquired knowledge has been used to study the possible use of transition metal dichalcogenides for photovoltaic applications. The candidate went through both the didactical and the practical aspect of the theme in an excellent way thus fulfilling at the best all the assignments. |           |

|  |                |
|--|----------------|
| <b>Activity and independence when creating final thesis</b>  | B - very good. |
| <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>   |                |
| The candidate performed the planned analysis independently; his insights allowed to uncover some subtle details of the electronic structure which will be subject of further investigation and eventually publication on impacted journals. The level of his English language allowed him to write the thesis almost independently with limited intervention from my side. The candidate was responding to the assigned task in a timely manner according to the planned schedule. |                |

|  |                |
|--|----------------|
| <b>Technical level</b>   | B - very good. |
| <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>                  |                |
| The technical level is high and the results are clearly presented and discussed. For this reason, the results will be part of a planned publication in impacted scientific journals. |                |

|   |                |
|---|----------------|
| <b>Formal level and language level, scope of thesis</b>   | A - excellent. |
| <i>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?</i>   |                |
| The first chapters of the thesis present the quantum mechanical theory and the technical aspects in a way that is a good starting point for all those young investigators at their first approach to the subject. The results are clearly presented in a fluent English language, easy to understand and technically detailed at the same time. |                |

**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 review literature was compiled carefully and includes all the relevant sources. The citations were used correctly.

**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.*

The candidate faithfully solved the given problem and the achieved results are valuable and add further insight to the knowledge of the physics of the studied system. Considering also that the candidate had to build his own knowledge of the quantum mechanics and the related technicalities and software, I evaluate the whole work as excellent. The candidate is a very promising future independent researcher.

### 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.*

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

Date: **2.8.2021**

Signature: