ČVUT
ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE

# THESIS SUPERVISOR'S REPORT

## I. IDENTIFICATION DATA

| | |
|---|---|
| **Thesis title:** | **Fiber-optic based Fabry-Pérot interferometry for high-resolution motion detection** |
| **Author's name:** | **Shou-Yue Chen** |
| **Type of thesis :** | master |
| **Faculty/Institute:** | Faculty of Electrical Engineering (FEE) |
| **Department:** | Electromagnetic Field |
| **Thesis reviewer:** | Ing. Matěj Komanec, Ph.D. |
| **Reviewer's department:** | Electromagnetic Field |

## II. EVALUATION OF INDIVIDUAL CRITERIA

**Assignment** — **challenging**

*How demanding was the assigned project?*

The thesis goals included both theoretical and practical topics, where especially the experimental part was challenging and included a vast measurement campaign. To design and build a fiber-based Fabry-Perot interferometer for motion detection with nm-scale resolution is for sure a demanding task.

**Fulfilment of assignment** — **fulfilled**

*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.*

The student has fulfilled all the diploma thesis assignments. In the experimental part, the results covering the single and double Fabry-Perot interferometers are very extensive. Resolution well below the set value of 100 nm was achieved, and various effects on the sensor performance were analyzed. On the other hand, the theoretical part and especially the comparison with other FPI sensors is a bit vague.

**Activity and independence when creating final thesis** — **A - excellent.**

*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.*

During the thesis preparation, the student was very active, carried out a lot of measurement, consulted the progress, and proposed the measurement methods. The thesis was delivered on time.

**Technical level** — **B - very good.**

*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?*

The student proposed and realized both a single and dual-cavity Fabry-Perot interferometers and studied their performance in terms of sensitivity, resolution, working range, and much more. There is no doubt the technical level of the experimental part is very high, and the student showed great expertise in FPI optimization and analysis. However, the results are presented often chaotically, and many of the presented figures are not discussed in detail, and results are not put into context with other outputs.

**Formal level and language level, scope of thesis** — **C - 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 presents great experimental results but lacks in the dissemination of the results and the relatively small extent of the thesis overall. Some parts of the thesis are not clear, and the reader may easily skip or misunderstand some of the main results, which is a pity considering the high quality of the achieved results (i.e., resolution, double-cavity FPI for working range extension, etc.). The grammar/English is sufficient, typos are present but not frequent.

ČVUT
ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE

# THESIS SUPERVISOR'S REPORT

| **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?* | |
| References are cited as they should be. Sources are adequate. The bibliography has some formal drawbacks, and the formatting is not identical for all the sources. | |

| **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 student presents a high-quality thesis in terms of achieved experimental results. Resolution of 2 nm in motion detection is an extremely nice value, considering the proposed configuration with a fixed CW laser and a relatively simple cavity setup. Furthermore, the working range extension by using two cavities/Fabry-Perot interferometers shows exciting results. The strengths of the thesis are thus, undoubtedly the experimental outcomes, whereas their discussion and presentation is the biggest weakness of the thesis. The grammar, thesis extent, and readability significantly lower the overall impression. |

## 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 student presents a diploma thesis with high-quality experimental results, where two Fabry-Perot interferometer configurations are proposed with two different reflective surfaces. Working range extension is proposed and verified. Sensitivity, resolution, angle dependence, and other parameters are analyzed and discussed. Resolution of 2.08 nm is well below the set goal of 100 nm. All experimental assignments were carried out to a great extent and detail.

The discussion of the results is the main weakness of the thesis, as it conceals the quality of the results, and the reader may often get lost. Furthermore, the grammar and overall text readability are sometimes of a lower level. The thesis itself is a bit short.

The grade that I award for the thesis is **B - very good.**

Date: **1.6.2020**

Signature: