STATEMENT REPORT

by professor PhD Nikolai Manev,

The Institute of Mathematics and Informatics – BAS

about the dissertation thesis of **Miroslav Markov** entitled

“Effective algorithms with application in public key cryptography and coding theory”

Submitted for acquiring “**Ph. D. degree**”

Area of Higher Education: **4. Natural Sciences, Mathematics and Informatics**,

Professional Field: **4.6 Informatics and Computer Sciences**

Ph.D. program: **“Informatics”**

Scientific Adviser: **Yuri Borissov**

1. General description of the procedure and the applicant

Miroslav Markov was born in 1969. He received MS degree with subject “Communication technology and systems” at Technical university of Sofia in 1996. Bachelor degree with subject “Informatics” received in 2006 at the Faculty of Mathematics and Informatics of the Sofia University “St. Kliment Ohridski”. Markov started his PhD study at 1.07.2019. Since August 2022 till now he is at full time position as researcher at section “Mathematical Foundations of Informatics” of the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (IMI-BAS).

By order № 208 / 18.07.2024 г. of the Director of the IMI-BAS I was appointed as a member of the Scientific Jury. In such a capacity I received all required documents (in digital form) that concern the procedure. The documents shows that the applicant fully meets the minimal national requirements according to the Act on Development of the Academic Staff in the Republic of Bulgaria as well as the Regulations for the conditions and rules for acquiring PhD degree of the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences.

2. Approbation of the results in the dissertation

The results presented in the dissertation have been published in 4 papers, all with candidate's adviser Y. Borissov as coauthor. One paper has impact factor (Q1) and the others are indexed by IEEE Xplore.
The papers have not been used for acquiring other degree or for occupying positions.

3. Assessment of the personal contribution of the applicant in joint works

According my personal observations I can conclude that the personal contribution of Miroslav Markov to joint papers is equipollent.

4. Impact of the results on the work of other scientists

Miroslav Markov has presented information about citations of his papers although the Act on Development of the Academic Staff in the Republic of Bulgaria does not require the existence of citations.

5. Quality of the dissertation Abstract

The Abstract contains 50 pages and presents correctly the content of the chapters and the spirit of the dissertation as a whole. It underlines also the main results obtained in the thesis.

6. Description and analysis of results in the thesis

The dissertation thesis contains 87 pages and consists of Introduction, three chapters and Bibliography with 59 titles. Each chapter starts with necessary definitions and results followed by description of the author's original results.

Chapter 1 and Chapter 2 concern the task for determining the number of points of two families of elliptic curves E_p and D_p, respectively. The author proposes a new approach and algorithms that require less computational resources. At the end of each chapter an example with 256 (224 resp.) bits long primes p is given and the corresponding computations have been done. .

Chapter 3 addresses several decades old task, namely, computation of the weight distribution of Reed-Muller code $R(4,9)$. Combining known results Markov constructs an algorithm and realizes it for successful solving the problem.

According to the opinion of Miroslav Markov his scientific contributions are six and they are listed on the pages 43 and 44 of the Abstract. I agree with his opinion.

The contributions of Miroslav Markov are solutions of difficult and interesting problems.

7. Critical remarks

I have no essential critical remarks.

CONCLUSION

The dissertation thesis of Miroslav Markov contains results that are original contribution to the studied scientific area. The thesis fully meets the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its application, and the Regulations for the conditions and rules for acquiring PhD degree of the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences. Markov demonstrates qualities and abilities for carrying out self-depended investigations**.**

Based on the aforesaid in this report **I give positive estimation of the considered dissertation and strongly recommend the Scientific Jury to confer on Miroslav Markov the educational and scientific degree "Doctor" in area 4. Natural Sciences, Mathematics and Informatics**, **professional field: 4.6 Informatics and Computer Sciences, Ph.D. program: "Informatics".**

01.09.2024 г. Signature:

Sofia Prof. N. L. Manev