

OPINION

by Eng. Dimitar Mihaylov Tokmakov, PhD

Professor at the ECIT department, Faculty of Physics and Technology,

University of Plovdiv "Paisii Hilendarski"

on the dissertation for the award of the educational and scientific degree "PhD"

by: field of higher education: *5 Technical sciences*

Professional field : *5.3. Communication and computer engineering*

Doctoral programme: "*Automation of areas of the intangible sphere (medicine, education, science, administration, etc.)*"

Author: *Hristo Anastasov Kanevski*

Topic:" "Application of Computer Technologies for Improving the Environmental Performance of Automobile Transport'"

Scientific supervisor: Prof. Dr. Slavi Lyubomirov, Department of Mechanical Engineering and Transport, Faculty of Physics and Technology, **Paisii Hilendarski University of Plovdiv**

1. General presentation of the procedure and the PhD student

By order of the Rector of Paisii Hilendarski University of Plovdiv (Order No. RD-22-93 dated 17.01.2025), I have been appointed as a member of the scientific jury for the defense of the dissertation entitled "Application of Computer Technologies for Improving the Environmental Performance of Automobile Transport" for the acquisition of the educational and scientific degree "Doctor" in the field of higher education 5. Technical sciences, professional field, 5.3. Communication and computer engineering, doctoral programme Automation of areas of the intangible sphere (medicine, education, science, administrative activity, etc.).

The dissertation materials submitted by Hristo Kanevski comply with **Article 36 (1)** of the Regulations for the Development of the Academic Staff of Paisii Hilendarski University of Plovdiv. The submitted documents include:

- An application to the Rector for initiating the dissertation defense procedure
- A European-format CV
- A departmental council protocol confirming readiness for the dissertation defense
- The dissertation itself

- An abstract (author's summary)
- A list of scientific publications related to the dissertation
- Copies of scientific publications
- A declaration of originality and authenticity of the documents
- A compliance report with the minimum national requirements

The doctoral candidate has submitted **six copies** of his publications on the dissertation topic, ensuring compliance with all regulatory and university requirements.

Hristo Kanevski completed his secondary education at “Hristo Botev” Vocational Technical School, Smolyan, in 2011. He earned a Bachelor’s degree in Automotive Engineering from Paisii Hilendarski University of Plovdiv in 2019 and completed a Master’s degree in Automotive Engineering at the same institution in 2020.

His professional experience includes:

May 2011 – October 2020: Mechanic at Auto Kanevski Ltd., Smolyan.

Since 2020: Assistant Lecturer in Automotive Electronic Systems at the Department of Mechanical Engineering and Transport, Faculty of Physics and Technology, Paisii Hilendarski University of Plovdiv

I have personally known Eng. Hristo Kanevski, and my impressions of his expertise in automotive engineering and computer technologies have been formed through his doctoral studies and his work leading laboratory exercises for students at the Faculty of Physics and Technology.

2. Topical relevance

The literature review and analysis indicate that improving the environmental performance of automobile transport is highly relevant in the context of global efforts for environmental protection, decarbonization, and sustainable transport.

The dissertation defines clear and relevant research objectives:

1. Conduct a study and analysis of the composition of exhaust gases to assess emissions affecting environmental indicators in internal combustion engines (ICEs).
2. Develop and test an experimental setup and methodology for investigating various engine malfunctions and their impact on emissions.
3. Select an appropriate approach for studying the factors influencing the emission of harmful gases in vehicles with ICEs.

4. Perform experimental research applying computer technologies to enhance environmental performance factors.

5. Conduct vehicle tests to improve environmental parameters concerning CO, HC, CO₂ and analyze the results.

3. Knowledge of the problem

The dissertation references 131 publications, with a significant portion being indexed in Scopus and Web of Science. Most sources are in English and were published after 2010, demonstrating a comprehensive analysis of the problem's current state.

Throughout the research, the doctoral candidate effectively evaluates and interprets the literature, incorporating original ideas in developing tested algorithms, software, hardware, and systems.

4. Research methodology

The methodology is based on systematic analysis, experimental measurements, and comparative analysis of factors affecting harmful gas emissions in internal combustion engines (ICEs).

The main research stages:

1. Theoretical analysis and classification of existing methods and techniques:
 - Review of scientific literature and regulatory documents on harmful emissions measurement.
 - Investigation of the main factors influencing exhaust gas composition.

2. Development and implementation of an experimental setup:
 - Construction of a test system for evaluating different engine conditions and malfunctions.
 - Development of methods for measuring key environmental indicators (CO₂, CO, HC, NO_x, etc.).

3. Experimental studies:
 - Tests conducted under varied engine operating conditions, including fuel-air ratio and ignition timing variations.

- Exhaust gas values recorded to determine environmental impact.

4. Processing and analysis of results:

- Statistical and comparative analysis performed on collected data.
- Determination of optimal parameters for minimizing emissions.

5. Characteristics and evaluation of the thesis and contributions

Chapter I presents the "State of the Art Analysis". Chapter II describes "Technologies to improve the environmental performance of internal combustion engines". Chapter III presents "Simulation of engine faults and their impact on emissions". Chapter IV presents the experimental studies" and their results.

In the Conclusion, the scientific and applied contributions of the thesis are framed, which I believe are built on reliable material, since in Chapter IV very detailed tables and graphs with the results of the experiments performed are shown.

6. Assessment of publications and personal contribution of the PhD student

The dissertation findings have been published in six scientific papers:

- Three in Bulgarian
- Three in English
- One paper indexed in Scopus and Web of Science (Q4 journal)
- Five conference papers (peer-reviewed but not indexed in Scopus/Web of Science)

The publications adequately reflect the dissertation's key contributions, and Христо Kanevski's personal involvement in the research is undeniable

7. Abstract

The abstract has been prepared according to the requirements of the relevant regulations, and reflects the main results achieved in the dissertation.

8. Recommendations for future use of the dissertation contributions and results

It would be beneficial to incorporate the research results into newly developed laboratory exercises in Automotive Engineering, forming a complete academic course.

CONCLUSION

The dissertation of Hristo Anastasov Kanevski contains scientific and applied results, which represent an original contribution to science and fully meets the requirements of the Law for the Development of the Academic Staff of the Republic of Bulgaria, the Regulations for its implementation and the Regulations for the Conditions and Procedure for the Acquisition of Scientific Degrees at Paisii Hilendarski University of Plovdiv. The attached abstract reflects the essence of the research and correctly presents the contributions. The dissertation shows that Hristo Kanevski possesses in-depth theoretical knowledge and professional skills in the scientific specialty "Automation of areas of the intangible sphere (medicine, education, science, administrative activity, etc.)", demonstrating qualities and skills for independent scientific research. Taking into account the merits, topicality, significance of submitted dissertation, I give it a positive evaluation and propose to the jury to award to Hristo Anastasov Kanevski the educational and scientific degree "DOCTOR" in scientific field 5 Technical sciences, 5.3. Communication and computer engineering, doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activity, etc.)".

20.02.2025

Prepared by:.....

/prof. Dr. Dimitar Tokmakov/