

S T A T E M E N T

By Prof. Asen Kanchev Rahnev, PhD

Of a dissertation on the topic of

**“Methods and Architectural Approaches for Semantic Indexing and
Simulation of Dynamic Processes in a Cloud Environment”**

Author of the dissertation: Pavel Aleksandrov Kyurkchiev

for awarding the educational and scientific degree “Doctor”

Field of higher education: 4. Natural sciences, Mathematics, and Informatics;

Professional field: 4.6 Informatics and Computer Science

Doctoral program: Informatics

By order № RD-22-1415 of 17.07.2026 of the Rector of the University of Plovdiv “Paisii Hilendarski” (PU), I have been appointed a member of the Scientific Jury to participate in a procedure for the defense of a dissertation on the topic of “Methods and Architectural Approaches for Semantic Indexing and Simulation of Dynamic Processes in a Cloud Environment” for acquiring the educational and scientific degree “Doctor” in field of higher education 4. Natural sciences, Mathematics and Informatics; professional field 4.6 Informatics and Computer Science, doctoral program: Informatics. The author of the dissertation is Pavel Aleksandrov Kyurkchiev - a doctoral student in an independent form of study at the Department of Computer Technologies, with scientific supervisor Prof. Anton Iliev Iliev, PhD, University of Plovdiv “Paisii Hilendarski”.

In my capacity as a member of the scientific jury, I have received from Pavel Aleksandrov Kyurkchiev the full set of materials on electronic media in accordance with Art. 36 (1) of the Law on the Development of the Academic Staff of PU.

The dissertation “Methods and Architectural Approaches for Semantic Indexing and Simulation of Dynamic Processes in a Cloud Environment” developed by Pavel Aleksandrov Kyurkchiev presents in a finished form the results of an in-depth study in a topical area. The dissertation has a volume of 140 pages. It consists of an introduction, five chapters, a conclusion, contributions, a list of the author’s publications, an approbation, three appendices, and a bibliography including 146 sources.

In the introduction, the relevance of the problem, the object and subject of the study, the aim of the dissertation, the working hypothesis, the tasks, and the research methodology are well defined. The aim of the dissertation is clearly formulated: “To study and apply the methods of the “System Dynamics” formalism together with modern technologies for semantic analysis and vector search in a cloud environment, and, through the implementation of a prototype, to validate a methodology for visual modeling, numerical simulation, and intelligent retrieval of dynamic processes.”

The doctoral student has good theoretical training, practical skills, and experience with the technologies necessary to achieve the aim of the dissertation work.

The first two chapters, “Analysis of the Subject Area and Existing Solutions” and “Mathematical Formalism and Theoretical Foundations,” are of a review and theoretical nature. Particularly valuable in them are the analyses made and the conclusions drawn at the end of the chapters. This demonstrates the high theoretical and professional training of the doctoral student.

The main contributions of the dissertation are presented in the next two chapters, “Methodology for Transformation, Simulation, and Intelligent Search” and “Architecture of the Alpha Cloud Data Hub Platform.” A methodology for “Semantic Linearization,” tokenization of cycles, and others has been developed; the algorithmic framework of the Alpha Cloud Data Hub system is defined and its architecture is described. In these chapters, the doctoral student demonstrates his serious algorithmic knowledge and skills.

The fifth chapter, “Experimental Validation and Analysis of the Results,” uses a specialized test corpus of 63 system-dynamic models from various fields. For this test corpus, the semantic approach achieves the excellent result $F1\text{-Score} = 1.00$.

The main results of the dissertation are summarized in the conclusion. The relationships between the contributions, aims, and tasks of the dissertation and the publications made are clearly presented in a table. I accept the scientific-applied and applied contributions formulated by the doctoral student. The prospects for future development are also briefly noted as opportunities for continuing the research on the topic.

The doctoral student has submitted a list of 3 publications on his dissertation, in which no plagiarism has been proven by a legally established procedure. The first publication, from a scientific conference, is in Bulgarian, and the other two are in English. The third publication is

indexed in WoS and SCOPUS with IF 4.6 and quartile Q2, which satisfies the minimum national requirements for the educational and scientific degree “Doctor” and significantly exceeds them. Part of the results obtained in the study have been used in 2 university projects. Pavel Kyurkchiev has presented 2 reports at conferences related to the results of the study.

The abstract is submitted in accordance with the requirements in Bulgarian and English, in the amount of 32 pages, and in terms of volume and content it meets the requirements for a complete and concise reflection of the dissertation thesis.

I have known Pavel Kyurkchiev for about 15 years — as a distinguished student and later as an assistant at the Department of Computer Technologies at FMI at PU. Even then, he impressed me with his knowledge. Pavel Kyurkchiev is a responsible colleague who can work in a team.

I would recommend that the doctoral student, in his future teaching and scientific work and in the preparation of documents, minimize the use of English words and phrases from the professional jargon, and also cite the literature sources more precisely and completely.

Conclusion: My assessment of the dissertation, the abstract, the scientific publications, and the scientific contributions of Pavel Aleksandrov Kyurkchiev is positive.

The presented dissertation fully complies with the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Rules for the Implementation of the Act for the Development of the Academic Staff in the Republic of Bulgaria, and the Law on the Development of the Academic Staff of the University of Plovdiv “Paisii Hilendarski” for the acquisition of the educational and scientific degree “Doctor”.

The achieved results give me a reason to confidently propose to award the educational and scientific degree “Doctor” to Pavel Aleksandrov Kyurkchiev in field of higher education: 4. Natural sciences, Mathematics, and Informatics; professional field: 4.6 Informatics and Computer Science, doctoral program: Informatics.

26.08.2026
Plovdiv

Signature:

/Prof. Asen Rahnev, PhD