REVIEW

by Assoc. Prof. Dr. Eng. Dimcho Yordanov Pulov, Technical University - Gabrovo on the materials submitted for participation in a competition for the academic position of "Associate Professor" in
field of higher education – 5. Technical sciences,
professional field – 5.1. Mechanical Engineering,
specialty – Electronic (analog and digital) measuring transducers and instruments
with candidate senior assistant, Dr. Eng. Borislav Atanasov Georgiev

1. Competition information

The competition for the academic position of Associate Professor was announced in the State Gazette, issue No. 48 of 13 June 2025, as well as on the official website of the Technical University of Gabrovo. The procedure was initiated to meet the academic and research needs of the Department of Mechanical and Precision Engineering within the Faculty of Mechanical and Precision Engineering.

2. Candidate information

One candidate has applied for the competition – Chief Assistant Professor Dr. Eng. Borislav Atanasov Georgiev, lecturer at the Department of Mechanical and Precision Engineering. He holds a Master's degree in Mechanical and Precision Engineering from the Technical University of Gabrovo. Dr. Georgiev defended a doctoral dissertation entitled "Investigation and Optimisation of the Dynamics of an Electrohydraulic Servo Drive System", through which he obtained the educational and scientific degree of Doctor in the scientific field "Hydraulic and Pneumatic Drive Systems", within the professional area of Mechanical Engineering.

Dr. Georgiev possesses extensive practical experience in the industrial sector, where he has held both organisational and technical positions, contributing to the application of engineering principles in real production environments.

His academic career began in 2018 as an Assistant Professor at the Department of Mechanical and Precision Engineering, Technical University of Gabrovo, and since 2020 he has held the position of Chief Assistant Professor in the same department. He is proficient in English and Russian.

3. Overview of the content and results in the presented papers

Chief Assistant Professor Dr Eng. Borislav Atanasov Georgiev participates in the competition with scientific works that do not duplicate those submitted for the acquisition of the educational and scientific degree "Doctor" or for appointment to the academic position of Chief Assistant Professor.

The candidate presents for evaluation a body of scientific works which can be grouped into three main categories:

- Habilitation work (monograph);
- Scientific publications – journal articles and conference papers;
- Teaching aid (laboratory manual).

In his habilitation work, Dr Georgiev provides a comprehensive study of the theory, analysis, and practical application of adaptive control methods in electrohydraulic systems, which constitute a key element of modern mechatronic technologies. The monograph encompasses the complete research cycle – from theoretical modelling and analysis of nonlinear dependencies to the development of practical algorithms and engineering solutions aimed at optimising dynamic processes. The author examines in detail the structure, operating principles, and specific characteristics of various types of electrohydraulic actuators, analysing their energy efficiency, stability, and performance under variable operating conditions.

A significant contribution is made through the study of adaptive algorithms, including recursive methods, Kalman filters, and hybrid approaches, which enable automatic parameter tuning in real time. These methods allow for effective compensation of external disturbances, structural inaccuracies, and component degradation, thereby improving control precision and stability. The author performs a systematic analysis of the energy potential of electrohydraulic systems and proposes methods to enhance efficiency through frequency control and optimised regulators.

The monograph includes a substantial experimental section, presenting comparative analyses between classical and adaptive systems that convincingly demonstrate the advantages of the proposed approaches. Clear tables, diagrams, and case studies illustrate the practical applicability of the developed solutions in areas such as metalworking, robotics, transportation systems, and energy engineering. The integration of theoretical frameworks with practical implementation gives the work a high scientific and engineering value, while the author's systematic approach reflects research maturity and methodological consistency.

The candidate for the academic position of Associate Professor presents a scientific output comprising 21 publications, representing a consistent and in-depth research effort in the fields of electrohydraulic systems, adaptive control, and measurement technologies. A significant portion of these works have been published in refereed and indexed journals, with eleven papers indexed in internationally recognised databases such as Scopus and Web of Science, and three papers published in journals with impact factor and/or SJR ranking, which confirms both the international visibility and quality of the research.

Dr Georgiev's scientific contributions focus on modelling, analysis, and optimisation of dynamic processes in electrohydraulic and mechatronic systems, as well as on the application of adaptive parameter estimation algorithms, Kalman filters, and the least-squares method. He also investigates systems for measuring angular orientation and spatial positioning of moving objects, developing error-compensation methods for the determination of roll and pitch angles. His publications reveal the complete research cycle – from mathematical modelling and computer simulation to experimental validation and analytical evaluation of results.

Of particular importance are the studies devoted to parameter estimation and control in electrohydraulic systems using advanced adaptive filters, as well as papers examining accuracy in 3D printing and metrological assessment of measuring instruments. The research exhibits a clear engineering orientation and focus on practical implementation.

The candidate also demonstrates active participation in collaborative research, contributing substantially to joint projects and co-authored publications with other established scholars. At the same time, in ten of his publications, Dr Georgiev is the first author, which highlights his leadership role in the research process, his ability to formulate key scientific objectives, and to guide their practical implementation.

Based on the analysis, it can be concluded that Chief Assistant Professor Dr Eng. Borislav Georgiev is an established researcher with a well-defined scientific identity, whose works hold significant value for both scientific theory and engineering practice.

The teaching aid “Laboratory Manual in Elements of Automation”, authored by Dr Georgiev, represents a comprehensive and well-structured work intended for students of Mechatronics. It covers the essential theoretical foundations and practical aspects of the discipline, providing a seamless transition from fundamental principles of automation to hands-on practice with Programmable Logic Controllers (PLCs). The laboratory exercises are systematically organised – starting from fundamental theoretical and practical tasks explaining the structure and operating principles of PLCs, and progressing to experimental sessions with real equipment and modular control systems.

The author has developed the content with high methodological clarity and engineering precision. The manual traces the historical evolution of control technology – from relay logic to modern programmable controllers – emphasising trends toward digitalisation, modularity, and intelligent control. Key topics include PLC architecture, memory types, input-output modules, power supply systems, and the main stages of the operational cycle.

The manual contains specific laboratory tasks designed to foster analytical and engineering thinking among students. Each module is accompanied by clear objectives, instructions, and circuit diagrams, encouraging independent learning and experimental exploration. In the concluding sections, the author integrates knowledge from previous exercises into complex applied tasks closely related to real-world industrial applications, thereby significantly enhancing the practical value of the manual.

The work stands out with its professional presentation, clear methodological structure, and up-to-date content, fully aligned with modern standards of education in automation and mechatronics. It serves as a valuable teaching resource, effectively combining theoretical knowledge and engineering practice, and contributes to improving the quality of students’ professional training.

4. Reflection of the candidate's scientific publications in the scientific community

The citation report shows that the scientific works of Chief Asst. Prof. Dr Eng. Borislav Georgiev have received a notable scholarly response, confirming their scientific relevance and contemporary significance. The total number of identified citations is 19, of which 11 appear in publications indexed and referenced in the international databases Web of Science and Scopus. This serves as a clear indicator of the visibility and impact of his research within the scientific community. The cited works encompass the main areas of the author’s research activity, including adaptive control methods for electrohydraulic systems, Kalman filtering, metrology, and measurement technologies.

5. General characteristics of the candidate's activities

5.1. Educational and pedagogical activities

Chief Asst. Prof. Dr. Eng. Borislav Georgiev is an active and accomplished university lecturer who lectures in six disciplines in the Bachelor's and Master's degree programs. He is distinguished by precision, consistency and commitment in his work with students. He skillfully combines theoretical teaching with practical experiments, which stimulates interest in engineering disciplines.

5.2 . Scientific and applied scientific activities

Chief Assistant Professor Dr Eng. Borislav Atanasov Georgiev has established himself as a researcher with a comprehensive and systematic contribution in the fields of mechatronic systems, electrohydraulic drives, and measurement transducers. His scientific interests are focused on adaptive control methods and parameter identification in dynamic measurement and control systems. His research results find direct application in the development of precision measuring instruments, electrohydraulic control systems, and mechatronic devices, as well as in the optimisation of industrial processes.

In the sphere of applied research, Dr Georgiev has demonstrated proven expertise through participation in seven international, national, and university projects related to intelligent measurement systems, automation, and adaptive control algorithms. He takes an active role in modelling, simulation experiments, and implementation of research results, demonstrating the ability to integrate theoretical concepts with practical engineering realisation.

In conclusion, the scientific and applied research activities of Dr Georgiev are characterised by a high degree of originality, methodological consistency, and practical applicability. His work fully corresponds to the thematic scope and profile of the speciality "Electronic (Analogue and Digital) Measuring Transducers and Instruments", and makes a significant contribution to the advancement of modern intelligent measurement and control systems.

6. Contributions . Significance of contributions to science and practice

The contributions presented in the author's reference report are clearly formulated, methodologically sound, and well substantiated, encompassing both scientific-applied and practical results. The scientific-applied contributions are related to the development of new models, algorithms, and methodologies for adaptive estimation and control of dynamic processes in electrohydraulic and measurement systems, employing Kalman and Wiener filters, recursive methods, and algebraic approaches to enhance accuracy and stability. The practical contributions exhibit a distinct engineering orientation and are validated through experimental implementations, metrological verification, and calibration methodologies for systems measuring angular orientation. The results are practically applicable, demonstrating tangible benefits for the advancement of modern intelligent measurement and control systems. The formulated contributions are logically structured and possess high scientific and applied value.

7. Assessment of the candidate's personal contribution

The candidate demonstrates exceptional commitment and independence in research work. A significant part of the publications are his/her lead authorship, which testifies to personal contribution in formulating ideas, conducting experiments and analyzing results. He/she is able to work in a team and combine scientific activity with teaching.

8. Critical notes and recommendations

The scientific works of Chief Asst. Prof. Dr. Eng. Borislav Atanasov Georgiev are consistent and methodically sound. For his future development, it is recommended to strengthen international cooperation and activate publication activity in journals with a high impact factor. Expanding the experimental base and creating interdisciplinary projects would further increase the recognition and applied significance of his research and would further contribute to his establishment as a specialist in the field.

9. Personal impressions

I have known Dr Eng. Borislav Georgiev since the beginning of his academic career at the Department of Mechanical and Precision Engineering, and my impressions of him have been consistently excellent. He is a highly responsible, motivated, and goal-oriented professional who works with dedication and perseverance in both his teaching and research activities. Dr Georgiev demonstrates integrity and professionalism in his interactions with colleagues and students, showing initiative, teamwork skills, and a continuous drive for self-improvement. He is a balanced and reliable individual, upon whom one can depend in the fulfilment of both academic and professional responsibilities.

10. Conclusion

Given the above, **I propose to the esteemed Scientific Jury to award Chief Asst. Prof. Dr. Eng. Borislav Atanasov Georgiev the academic position of "Associate Professor"** in:
field of higher education - 5. Technical sciences,
professional field - 5.1. Mechanical Engineering,
specialty - Electronic (analog and digital) measuring transducers and instruments

25.10.2025 Signature:

/ Assoc. Prof. Dr. Eng. Dimcho Pulov/