

OPINION

by associate professor Dr Ivan Dimov Lirkov

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on documents, submitted for participation in a competition for the academic position of Assoc. Professor in professional area 4.6 “Informatics and Computer Science”, scientific specialty “Informatics” (modeling of large-scale complex systems) for the needs of Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences with candidate Venelin Todorov

1. Short biographical information

Venelin Todorov graduated from the Sofia University “St. Kliment Ohridski” in 2011 with Master’s Degree in Applied Mathematics. In 2017 he defended his thesis on the topic “Monte Carlo methods for multidimensional integrals and integral equations and applications”. In 2019 he has been elected for the academic position “assistant professor” at the Institute of Mathematics and Informatics — BAS.

2. General description of the presented materials

Publications — 20, of which 17 are articles in series with Impact rank and one paper in proceedings in IEEE Xplore.

3. Impact of the candidate’s scientific publications in the literature

Ten from the presented by the applicant candidate publications have been cited in 14 scientific papers, referenced and indexed in world famous scientific information databases (Scopus).

4. General characteristics of the applicant’s activities

(a) Scientific and applied scientific activity

Venelin has authored and co-authored more than 70 research publications and has participated in 12 research projects, of which: leader of 3 projects. In this competition he participated with 3 projects, two of which with Bulgarian NSF.

(b) Contributions

The applicant's contributions in the presented materials have scientific and applied scientific nature and are undoubted.

- Contributions to the development of new stochastic methods for sensitivity analysis of a complex ecological system with large dimension. The sensitivity of the concentrations of major air pollutants is analyzed. The concentrations are simulated by the model for long-range transport of air pollutants UNI-DEM and the results compared to the levels of four groups of harmful emissions. The sensitivity of the concentration of an important pollutant such as ozone to the changes in the rate constants of six ongoing chemical reactions described in UNI-DEM has been studied numerically, with different approaches to sensitivity analysis and different algorithms for numerical integration.
- Contributions in the field of application and comparison of existing stochastic methods for sensitivity analysis. The total sensitivity indices were studied using the three most widely used quasi-random sequences of Sobol, Halton, and Faure. The comparison of the results using lattice type point sets with an optimal generating vector, lattice type point set with generating vector the generalized Fibonacci series and the quasi-random Sobol series is done.
- Development of a new Monte Carlo method for linear systems with applications in ecology. The new Monte Carlo algorithm for solving linear systems is realized on the basis of the method of the "walk on equations" using a discrete Markov circuit. An optimal choice of the relaxation parameter leads to balancing the iterative matrix and to increasing the accuracy of the algorithm. The new method is much faster than the Monte Carlo method, and an advantage in terms of accuracy has been shown experimentally, especially for large-dimensional matrices.

5. Evaluation of the personal contribution of the applicant

I have no doubt about the personal contribution of the applicant in the presented publications.

6. Critical remarks

I have no critical remarks.

7. Conclusion

The presented materials convincingly prove the high professionalism of Dr. Venelin Todorov, the importance of his scientific achievements and their scientific impact. My personal impressions confirm the conclusions based on these materials.

Given the above, I wish to propose to the Scientific Jury to make a recommendation to the Scientific Council Dr. Venelin Todorov to be elected for the academic position “associated professor” in professional area 4.6 “Informatics and Computer Science”, scientific specialty “Informatics”.

April 27, 2021
Sofia

Member of the scientific jury:
assoc. prof. Dr Ivan Lirkov