

O P I N I O N

by Milen Ivanov, PhD

on the PhD thesis of
Margarita Nikolaeva Nikolova

Local properties of dynamical systems

in the field 4.5 Mathematics

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1. General description

The thesis presented by Margarita Nikolova consists of 60 pages. It consists of an introduction, preliminary information, three substantive chapters (3rd, 4th and 5th), a conclusion and a bibliography of 38 titles. On pages 55, 56 three author publications are indicated.

The dissertation contains original results. Reference to already known results is exhaustive and correct. The content is very well presented. The dissertation contains scientific results that are an original contribution to the scientific field and that can be continued in future research.

2. Personal impressions of the candidate

I have attended Margarita Nikolova's presentations and I am impressed by her good understanding of the topic and her inspiration.

3. Content of the thesis

Roughly speaking, the thesis investigates when the standard problem of driving a given ordinary differential equation is "regular" at the origin, that is, its trajectories fill an entire neighborhood. Although the question sounds very "classical", the research dates back deep into the second half of the 20th century and is quite non-trivial. The present work further develops a beautiful geometric approach proposed by Sussman and based on a close study of the structure of the generated Lie algebras.

In particular, equations with right-hand side homogeneous polynomials were studied and "holes" in the known general conditions were investigated - and filled. This is important because the general conditions are far from complete and the present work illuminates some dark fields in the theory.

The bibliography is comprehensive and shows a thorough knowledge of the field.

4. Probation of the results

The main contributions of the thesis are clearly stated in the Conclusion. However, sentences like "It's developed a nonstandard and complicated method to construct a "weight" of a Lie bracket." though grammatically correct do not sound in English.

Three articles in which the results of the dissertation have been published are indicated. The posts are impressive!

The submitted thesis and related publications contain original results and are free of plagiarism.

5. Quality of the abstract

The abstract is in Bulgarian, 39 pages and, as can be expected, 38 references. It comprehensively and correctly reflects the results obtained. In the author's reference, part of the author's abstract, the contributions of the dissertation work are clearly indicated.

6. Conclusion

Margarita Nikolova's thesis is an original research. The obtained results are new, interesting and have potential for future development.

On the basis of the above analysis, I confirm that the presented dissertation work and the scientific publications to it, as well as the quality and originality of the results presented in them, meet the requirements of applicable law, the Regulations for its application and the relevant Regulations of the Sofia University for acquisition by the candidate of the educational and scientific degree PhD in professional field of mathematics. In particular, the candidate satisfies the minimum national requirements in the professional direction and no plagiarism has been found in the scientific works submitted.

Based on the above, I strongly recommend the scientific jury to grant Margarita Nikolova PhD in scientific field 4. Natural sciences, mathematics and informatics, professional direction 4.5 Mathematics.

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