

OPINION

by Assoc. Prof. Dr. Yulian Tsankov Tsankov
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on the dissertation for awarding the degree of Doctor of Sciences
in the capacity as a member of the scientific jury for the competition according
to
Order No. RD 38-113 / 19.02.2020 of the Rector of Sofia University.

Higher education: Natural Sciences, Mathematics and Computer Science
Professional Degree: 4.5 Mathematics

Author of the dissertation:
Assoc. Prof. Dr. Ivan Minchev Minchev

Topic:
"The geometry of quaternionic-contact manifolds and the Yamabe problem"

1. General description of the dissertation

The thesis is written on 208 pages and it is on English language. It consists of Introduction, four Chapters and Bibliography, that refers to 91 scientific sources. All of the referenced titles are used in the dissertation. The dissertation is based on two papers of Ivan Minchev in journals with IF. In this thesis the author considers a variety of problems related to the theory of quaternionic-contact (QC) manifolds and related Yamabe problem.

The dissertation meets all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the implementation of the LDASRB and the corresponding Rules of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" for awarding the Doctor of Science degree.

2. Important scientific contributions of the thesis

In Chapter 2 three theorems are proved (marked by A, B и C in dissertation). These theorems are new in the QC geometry.

Using theorem C from Chapter 2 in Chapter 3 the author proves theorem D which states that QC scalar curvature of every seven-dimensional QC Einstein manifold is constant. It is noted that the main application of this theorem is in the removal of in advance estimation of QC scalar curve constancy in previous results for seven-dimensional Einstein manifolds.

In Chapter 4 with theorem E the Yamabe problem is completely solved for seven-dimensional sphere. By using theorem E in theorem F it is found the best constant and function that sets the extreme of the L^2 Folland-Stein inequality about seven-dimensional quaternionic Heisenberg group. In order to prove theorem E the derived by the author divergence formulas for QC geometry are being used. They are analogical to the divergent formulas of the CR geometry in the Riemann geometry.

In Chapter 5 the author proves theorem E in which it is found the non-negative external functions in the L^2 Folland-Stein inequality about quaternionic Heisenberg group with arbitrary dimension. The best constant is found.

The thesis autoreferate of the dissertation „ The geometry of quaternionic-contact manifolds and the Yamabe problem “ reflects fully and exactly the content of the dissertation.

Remarks and recommendations None.

3. Conclusion

The dissertation „ The geometry of quaternionic-contact manifolds and the Yamabe problem“ presents the results of a meaningful and in-depth research in the area of modern Differential Geometry (in the specialty 4.5 Mathematics). **I can give a very positive** evaluation of the thesis and think that it fully complies all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the implementation of the LDASRB and the corresponding Rules of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" for awarding the Doctor of Science degree.

08.05.2020

Member of scientific jury :

Assoc. Prof. Dr. Yulian Tsankov