OPINION

on the dissertation for the acquisition of the educational and scientific degree
"Doctor" (PhD) in professional field 4.6 **"Informatics and Computer Sciences"**
and scientific specialty **01.01.12 "Informatics"**

Topic: „**Modeling of oil refining processes using generalized nets and intercriteria analysis**"
Doctoral student: **Eng. Danail Dichev Stratiev, MSc**
Prepared by: **Assoc. Prof. Dimitar Dimitrov, FMI, Sofia University "St. Kliment Ohridski"**

Biographical data

In 2015, Danail Stratiev graduated as a Bachelor of Industrial Management at the University "Prof. Dr. Asen Zlatarov" - Burgas. During the third year of his studies, he studied at the European University Viadrina under the Erasmus program. In 2017, he graduated as a Master in Oil and Gas Technology at the University "Prof. Dr. Asen Zlatarov". From 2018 to 2020, he enrolled in software development courses at SoftUni.

From the fourth year of his studies in 2014, he started working at Lukoil Neftochim Burgas AD as an intern and subsequently in various positions as an operator related to the hydrocracking of vacuum residue, and from 2020 to 2021 he was an information service programmer.

Since 2021, he has been enrolled as a doctoral student at the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences.

Dissertation

Danail Stratiev's dissertation is 151 pages long. It consists of an introduction, an exposition in six chapters, a conclusion, scientific and applied scientific contributions, a bibliography with 239 references, a list of publications on the dissertation work and a list of their citations.

The dissertation work is aimed at modeling and analysis of technological processes in an oil refinery using the generalized network (GN) apparatus. The main contribution is related to the consistent application of this formalism to describe real, complex and parallel production processes, which are difficult to adequately model with classical methods such as linear and dynamic programming.

GN models have been developed for the production of automotive gasolines, diesel fuels, gaseous products and heavy oil products. They take into account the logic of cause-and-effect relationships, the availability of raw materials and technological limitations. It is shown that the models can be used for synchronization and analysis of production processes, as well as as a basis for control and automation systems.

A hierarchical GN model of an oil refinery has been created, in which individual product models are combined as submodels. This approach allows for a comprehensive description of the production structure and the interrelationships between individual processes.

A significant contribution is the use of intercriteria analysis to study the relationships between the properties of crude oil and its fractions. Data on 244 crude oils and 151 of their properties have been analyzed. It has been shown that the method can be used to assess the similarity between different types of oil, which is useful in the selection of raw materials based on available production experience.

On this basis, an GN model of the oil selection process has been developed, which combines intercriteria analysis and historical information from the refinery's operation. The model can be used as a formal framework to support decisions when selecting crude oil for processing.

The dissertation also takes into account the practical experience of the doctoral student, acquired in a real production environment at Lukoil Neftochim, which was used in the construction of the models and in the interpretation of the results. The author demonstrates excellent knowledge of the subject area and the technological processes that are modeled using generalized networks. The developed GN models are feasible, and the functioning of one of them was simulated in the GN IDE environment, which confirms the applicability of the proposed approach.

I accept the scientific and applied scientific contributions presented in the dissertation. I consider that the aim of the dissertation has been achieved, as the objectives set out in the introduction have been successfully accomplished.

Publications related to the dissertation

A list of 8 publications related to the dissertation is presented. Seven of the articles are co-authored, with Danail Stratiev as the first author of 6 of them. Five of the articles are in publications with an impact factor and another one is in a publication with SJR.

Four of the presented publications have 10 citations. The cited articles have an impact factor or SJR.

The national minimum requirements regarding scientometric indicators for the award of the PhD degree are exceeded by a significant margin.

Outside the list of articles for the dissertation work, the doctoral student is the author of another 25 joint scientific publications. A list is presented with an impressive number of 142 citations for two thirds of the articles.

I do not know Danail Stratiev personally, but the above facts confirm my opinion that he is a well-established scientist, whose work is reflected in the work of a number of Bulgarian and international scientists.

Abstract of the dissertation

The abstract reflects the main points of the dissertation work.

Critical notes and recommendations

As a critical note, I would point out that the volume of the abstract of 85 pages is too large.

I would recommend that the author also publish independent articles.

The remarks mentioned above do not diminish the merits of the presented work.

Conclusion

The above statements provide sufficient grounds for me to give a positive evaluation of the dissertation and the accompanying materials, and to recommend that the esteemed members of the Scientific Jury vote for awarding Danail Dichev Stratiev the educational and scientific degree of Doctor in the professional field 4.6 "Informatics and Computer Science" and the scientific specialty 01.01.12 "Informatics."

19.01.2026 г.   Signature:

Sofia   /Assoc. Prof. Dimitar Dimitrov/