Институт по информационни и комуникационни технологии-БАН
Вх. №827/30.08.2019 г.

REVIEW

Of dissertation for acquiring educational and scientific degree "Doctor"

Scientific area: 5. Technical Sciences
Division: 5.2. Electrical engineering, Electronic and Automation
Discipline: 02.21.07 „Automated systems for information processing and management"
Dissertation's author: eng. Nikola Nikolaev Sabotinkov
Subject: "Research and management of safety systems in underground transport"
Tutor: IICT—BAS
Jury member: Assoc. Prof. dr.Tony Boyadjiev

1. Accuracy of the dissertation's problem in scientific and scientifically-applied matter

New underground railway systems are constantly being constructed globally, the existing ones are being spread and others are being upgraded. In result of this trend, the passenger flow is consistently growing. Given that, the dissertation topic of research and management of safety systems in underground transport is undoubtedly a question of present interest.

2. Problem and literature understanding degree

A wide and detailed material overview is made based on 50 scientific sources. The presented material shows deep understanding over the main problems of the topic and points at potential solutions. A review of the existing safety systems in the underground railways systems is made. The existing methods of reducing the concentration of fine particles (FP) and safety improvements are analyzed. The main purpose of the dissertation is made over this analysis – research and optimization of new and innovative means for management of safety systems in the underground railways, in order to improve the quality of the air and passenger safety.

3. Congruence between the goal and tasks and the achieved results

The goals and tasks of the dissertation are pointed out sharp and clear. The methods for the analysis are based on literature survey and principles of how to control parameters of the underground rail environment. Fine particles (FP) sources are pointed out. Current solutions used for FPs reduction and safety improvements in underground railways are analyzed. A typical solution for underground train station ventilation and air streams optimization system is examined. For simulation of production, spreading and deposition of FPs in the underground train station area, Discrete Elements Methods for industrial purposes EDEM software kit is being used. This software has also been used to asses FPs spreading during train travel in tunnels between underground train stations. In order to check the effects of doors placed at the entrance and exit of a train station, simulations with Solidworks Flow were done. The parameters of the four examined designs are presented in a table. Analysis of the results of test data shows the benefits of the author's new method of tunnel ventilation

with usage of high speed roller doors, mounted at the entrance and exit of the tunnel for each underground train station. This method improves the efficiency of the ventilation system and reduces high FPs concentration mostly in the range of 2.5μm to 10μm.

The author has succeeded to improve air purity and people safety in underground train stations through original scientific ideas. This results fully correspond to the initial tasks and targets of the dissertation.

4. Scientific and scientifically-applied contributions in the dissertation.

The presented material in the dissertation has a scientifically-applied contribution. With six publications in scientific magazines and participations in scientific conferences, the reliability of the results is confirmed. The main contributions can be categorized as follows:

- Systematization and analysis of types of factors which influence security and safety in the underground railway train stations is done
- Fine particles concentration in underground railway is studied and main sources of pollution are defined.
- Current solutions for fine particles concentration reduction and safety improvement are examined and assessed
- Ventilation optimization solutions are presented for already existing underground railway stations and tunnels
- Simulations with new safety systems is conducted, results from the simulations are presented and analyzed, conclusions are drawn

5. Evaluation of the publications within the dissertation paper

Thorough results of the dissertation paper are published in six publications, as follows:

- Two articles in scientific magazines (published by BAS)
- One report at a scientific conference abroad (Croatia)
- Three reports at multinational conferences (Bulgaria)

Three of the articles are by himself – one in English and two in Bulgarian; One as part of a team on International conference in English; Two reported at conferences in Bulgaria.

The presented articles represent the main part and drawn conclusions of the dissertation. The scientific community has been introduced to the results from the dissertation through these six articles.

6. Notes, advices and comments

The presented research data, simulations and results in the dissertation are conducted through data from underground railway network of major cities such as London and Seoul. The scientific pattern to conduct and analyze ventilation systems

and safety measures in underground railway network presented in the dissertation, could be used to further develop or upgrade any existing underground railway network, given the technical specifications.

The layout of the dissertation is very good, good use of specialized terms and terminology, clear statement is made. Greater number of scientific sources would enhance the thoroughness of the work.

Syntax errors are noted, missed or misplaced punctuation, misspell – page 11, „особенно", page 72 "метрастанцията". Wrong use of superlative – page 68 "най-оптимален".

Chapter five starts straight with figure 67, after it Table 5 starts immediate. Text description of the table and the figures would make the conclusions based on that data far more clear and valid.

These inaccuracies from editorial stand point, does not affect the quality of the dissertation.

CONCLUSION

This dissertation fulfils the criteria of Bulgarian academic law with its volume and quality. Present are scientifically-applied and applied contributions, as well as enough publications on the dissertation topic. Given the dissertation problem of the day, its thoroughness, result appliances, I suggest to the scientific jury that mag. eng. Nikola Nikolaev Sabotinov is acknowledged as "Doctor" in discipline 5. Technical sciences, Division 5.2 Electronic, Electrical Engineering and Automation, Scientific are "Automated systems for information and management"

Reviewer : .....

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/ Ass. Prof. dr. T. Boiadjiev /

28.08.2019
Sofia