

Written review of the official Reviewer
on Raziyam Kurvanzhanovna Anayatova's thesis "The methodology for
reducing the impact of the human factor on flight safety" to fulfill requirements
for the Doctor of Philosophy (PhD) degree in the specialty Aviation Engineering
and Technology (6D071400)

No	Criteria	Compliance criteria (one of the answer options should be checked)	Science-based positions of the official Reviewer
1	2	3	4
1.	The topic of the thesis (as of the date of its approval) corresponds to the areas of scientific development and/or state programs	<p>1.1 Consistency with priority areas of scientific development or state programmes</p> <p>1) The thesis was carried out within the framework of a project or target program funded from the state budget (specify the name and number of the project or program)</p> <p>2) Dissertation completed as a part of another state program (specify program name)</p> <p>3) The thesis corresponds to the priority direction of science development, approved by the Higher Scientific-Technical Commission under the Government of the Republic of Kazakhstan (specify direction)</p>	<p>1) The thesis was executed within the grant funding of the Ministry of Education and Science of the Republic of Kazakhstan on "AP08857126 - Development of interactive training programs complex on technological repair processes of aircraft equipment";</p> <p>2) The dissertation was carried out within the framework of the state programme "Digital Kazakhstan" (№827 from December 12, 2017).</p>
2.	Importance to Science	The work does/does not make a significant contribution to science, and its importance is well disclosed/not disclosed	The work makes a significant contribution to science and its importance is well disclosed, as the thesis proposes a new methodology for reducing the impact of the human factor on flight safety by forming constraints on aircraft control and maintenance decisions based on intelligent assessment of the psycho-emotional state of aviation personnel.
3.	Principle of autonomy	Level of independence: 1) High; 2) Medium; 3) Low; 4) No independence	The level of work independence is high, as evidenced by the absence of borrowings and overlaps from other sources, and by the theoretical and practical competence of the applicant.

1	2	3	4
4.	The principle of internal unity	4.1 Rationale for the relevance of the thesis: 1) Justified ; 2) Partially justified; 3) Not substantiated.	The topic of the thesis is relevant and sufficiently substantiated in the thesis since more than 80% of aviation accidents and incidents are caused by the human factor.
		4.2 The content of the thesis reflects the theme of the thesis: 1) Reflects ; 2) Partially reflects; 3) Does not reflect	The content of the thesis reflects the theme of the thesis and fully discloses the proposals and solutions to the problem under study
		4.3 The aim and objectives are in line with the thesis topic: 1) correspond to; 2) partially correspond; 3) do not correspond; 3) do not correspond	Goals and objectives correspond to the theme of the thesis. At the same time, the number and sequence of tasks ensure the achievement of the research goal. Ensure the development of theoretical and methodological approaches, scientific and practical recommendations to improve flight safety by reducing the impact of human factor, by creating and optimizing methods for digital processing and intelligent analysis of speech signals of aviation and plain English phraseology.
		4.4 All sections and provisions of the thesis are logically interlinked: 1) are fully interconnected ; 2) interrelation is partial; 3) there is no interrelation.	All the sections and provisions of the thesis are logically and completely interconnected and follow on from each other consistently.
		4.5 The author's proposed new solutions (principles, methods) are argued and evaluated compared to known solutions: 1) there is a critical analysis ; 2) the analysis is partial; 3) the analysis is not the author's own opinions, and the quotes from other authors	The new solutions proposed by the author (principles, methods, algorithms, models, intelligent system) are argued, critically analyzed and evaluated compared to known solutions. Analytical and modelling techniques have been competently and objectively applied in the analysis.

1	2	3	4
5.	The principle of scientific novelty	5.1 Are the scientific results and provisions new? 1) Completely new ; 2) partly new (25-75% are new); 3) not new (less than 25% are new)	The scientific results and provisions are entirely new with particular reference to the methods developed for the sequential digital pre-processing of speech signals to classify on their basis the psycho-emotional state of aviation personnel.
		5.2 Are the conclusions of the thesis new? 1) Completely new ; 2) partly new (25-75% are new); 3) not new (less than 25% are new)	The conclusions of the thesis are entirely new, among which is the systematization of existing rules and regulations on radio communication phraseology for pilots and dispatchers, as well as standard phrases for engineering staff and flight attendants. This made it possible to propose scientific provisions and rules for the formation of phraseology for the recognition of psycho-emotional states according to seven archetypal classes.
		5.3 Technical, technological, economic or managerial solutions are new and sound: 1) completely new ; 2) partially new (25-75% are new); 3) not new (less than 25% are new)	Technical, technological, economic or managerial decisions are completely new and justified herewith the methodology developed to improve flight safety by taking expert corrective actions based on assessments of the emotional state of aviation personnel: pilots, dispatchers, engineers and flight attendants.

1	2	3	4
6.	Validity of main findings	All main findings are based / are not based on scientifically solid evidence or are sufficiently well founded (for qualitative research and training areas in the arts and humanities)	All main conclusions are based on scientifically weighted evidence using appropriate analytical research tools, computer modelling, as well as tools for automation of mathematical calculations and visualisation of results based on Python 3 language programming. As a result, an intelligent system for recognition of psycho-emotional states from the speech signal of aviation personnel is proposed. Its peculiarity is the possibility to produce quantitative and qualitative characteristics.
7.	Key points defended	<p>The following questions need to be answered for each provision individually:</p> <p>7.1 Is the provision proven? 1) proven;</p> <p>2) rather proven;; 3) rather not proven; 4) not proven;</p> <p>7.2 Is it trivial? 1) yes; 2) no</p> <p>7.3 Is it new? 1) yes;</p> <p>2) no.</p> <p>7.4 Level for application: 1) narrow; 2) medium; 3) broad</p> <p>7.5 Does the article prove it? 1) yes;</p> <p>2) no;</p>	All of the main points presented in the thesis and defended 1) are reasonably proven; 2) are not trivial; 3) are new; 4) have a broad level of application; 5) are proven in the author's articles.

1	2	3	4
8.	<p>The principle of credibility. Credibility of sources and information provided</p>	<p>8.1 Choice of methodology is justified or methodology described in sufficient detail</p> <p>1) yes 2) no</p>	<p>The choice of methodology is justified by the application of modern scientific statements on psychology and work safety, research on the impact of human factors in civil aviation, artificial intelligence and signal analysis technologies, as well as the rules of phraseology formation.</p>
		<p>8.2 The results of the thesis work are obtained using modern scientific research methods and techniques of data processing and interpretation with the use of computer technology:</p> <p>1) yes; 2) no</p>	<p>The results of the thesis work were obtained using modern scientific research methods and techniques of data processing and interpretation with the use of computer technology.</p>
		<p>8.3 Theoretical conclusions, models, identified correlations and regularities are proved and confirmed by experimental research (for teacher training areas the results are proved on the basis of pedagogical experiment):</p> <p>1) yes; 2) no.</p>	<p>The theoretical conclusions, models, identified, correlations and patterns are proved and confirmed by experimental research and computer modelling.</p>
		<p>8.4 Important statements are corroborated/partially corroborated/not supported by references to relevant and reliable scientific literature</p>	<p>Important statements are supported by references to relevant and reliable scientific literature.</p>
		<p>8.5 Literature sources used are sufficient/insufficient for the literature review</p>	<p>The literature sources used are sufficient for a literature review of the problem under study.</p>
9.	<p>The principle of practical value</p> <p>y</p>	<p>9.1 The thesis has theoretical significance:</p> <p>1) yes; 2) no</p>	<p>The thesis is of theoretical significance.</p>
		<p>9.2 The thesis has practical relevance and there is a high probability of the results being applied in practice:</p> <p>1) yes; 2) no.</p>	<p>The thesis has practical value, and there are certificates of implementation.</p>

1	2	3	4
		9.3 Are the proposals for practice new? 1) completely new ; 2) partly new (25-75% are new); 3) not new (less than 25% are new).	The dissertator's proposals and recommendations for practice are entirely new.
10.	Quality of academic writing and design	Quality of academic writing: 1) high ; 2) medium; 3) below average; 4) low.	The quality of the academic writing and layout of the thesis is quite high.

Decision of the official reviewer:

Do apply to the Committee for awarding the degree of Doctor of Philosophy (PhD) to a doctoral student Raziya Kurvanzhanovna Anayatova in the specialty 6D071400 - Aviation Engineering and Technology.

Official Reviewer,

Doctor of Engineering (Dr.sc.ing.),
Professor,
Transport and Communications Institute
(TSI)
Riga, Latvia
June 7, 2021



Medvedev
Alexander
Nikolayevich
(Medvedevs
Aleksandrs)

I confirm the signature of Professor A. Medvedev

7soosjW^

