

SUMMARY

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Modelling the aviation environmental safety system of relations
in terms of helicopter noise

PhD Thesis

My research focuses on environment protection, helicopter flight and environmental risk management collectively. The thesis defines new terms related to environmental safety; applies them to study the system of relations of the use of the environment, environment protection, environmental technology and environmental safety.

The objective of my thesis shall cover the following components:

- to specify and determine the terms necessary to approach environmental safety and environment protection from an integrated, systematic point of view;
- to analyse environmental safety and environment protection from a systematic approach, to develop system modelling methods;
- to specify the term and characteristics of environmental safety level based on the analysis of the double model of environmental safety and environment protection;
- to evaluate the level of environmental safety by analysing the environmental system operation and environmental impacts;
- based on a simulation procedure to characterise and to provide overall study of the environmental load probability distribution and of the outputs of the environmental system described by the possible environmental load values.

In my thesis I introduce the scientific background of air traffic, use of the environment, environmental impacts, environment protection and aviation safety. Next I carried out the analysis of ambient noise and noise protection for the questions concerning aviation and environmental safety, by introducing a new term, the environmental protection system. I also provided an overview on the environmental status specifics, on uncertainty and risks, and on the description of environmental impacts and modelling methods. A determining element was to develop the logical system of relations influencing the emergence of noise load.

During the research my instrumental measurements focused on helicopter noise, therefore based on the data on helicopter flight noise I carried out the analysis of the environmental safety system of relations, and developed the environmental safety triangle model representing my individual research result. A decisive part of my research activity is to study the uncertainty of the environmental status, which shall involve the search for a method facilitating the reduction of uncertainty and the consequent risks. For this I applied Monte-Carlo simulation, and the method developed incorporates the analysis of the helicopter landing site and individual aviation events.

The study results justify that the environmental load values, in this particular case the noise probability calculated by Monte-Carlo simulation produce such data, which provide a more accurate picture to describe the environmental status.