

MODEL OF ERGATIC AIR NAVIGATION SYSTEM WITH RADAR DATA PROCESSING

During many years the task of creation of effective airborne and ground-based weather radar systems stays very important. Analysis of the trends and achievements in airborne information means for flight safety shows that we can make significant progress in making effective instruments for detecting areas of hazardous meteorological phenomena (HMP) by using a set of different information about HMP, taking into account the all meaningful features of different sources of hazard. Among them are turbulence, lightning, hail, heavy precipitation, icing and others.

Aircraft operations without weather information are impossible. All flights of civil aircraft may be made only when the flight crews knowledge of meteorological conditions in the area of flight, landing point and alternate aerodromes. From the view of radar functionality the most difficult problem is detection of dangerous zones of flight, but with the evolution of airborne equipment and changing in weather all over the world we have received a new problem – overloading of the operator during receiving of information under the conditions of HMP.

The importance in studying of work of the operator is attached to the analysis of mistakes. In experimental psychology distinguish the following types of mistakes: perception errors, memory errors, thinking errors and attention errors.

Modern methods of the description of dynamics of the human operator are based generally on use of transfer function which, by definition, characterizes linear dynamics though actually the human operator is a difficult nonlinear link with variable structure and with the developed properties of adaptation to influences and forecasting of results of action. Therefore the adequate description of behavior of the person operator in dynamics represents a difficult task.

It is natural that limits of adaptation of the pilot to the plane are limited because of nonlinearity of its dynamic properties. In other words, the pilot can operate plane with rather good dynamic and static properties of controllability. Improvement of these properties is usually reached by means of special automatic devices. The linear continuous model doesn't consider ability of the person operator to exercise control at temporary disappearance of an entrance signal, and also discrete nature of management which is shown when tracking more high-frequency signals. Actually work of the operator corresponds to functioning of a pulse (discrete) chain, than continuous more.

As quantitative assessment of the air navigation system operator reliability can be used the probability of successful performance of the task at a given operation stage of ergatic system. During the synthesis of the requirements reference estimation for the air navigation system operator reliability obtaining of its operation possible only based on adequate analytical model.

As an analytical model of the air navigation system operator reliability, the diffusion non-monotonic model of errors distribution is recommended to use. It is not only satisfies the requirements for mentioned above the models of failures.