

# ESTIMATION OF THE EFFICIENCY OF INFLUENCE OF AEROSOLS «NON-LETHAL» WEAPONS ON ELECTRON-OPTICAL TOOLS AND LASER COMMUNICATION SYSTEMS.

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The present communication informs on the results of development of methodological and computer provision for evaluating the influence of the interferences from aerosols non – lethal weapons on the efficiency of electron-optical systems (EOS) of detection and laser communication systems (LCS).

Here we present the methodological developments and illustrative results on:

- comparative estimation of EOS and LCS efficiency when the aerosols non – lethal weapons screen detecting object,
- comparative evaluation of efficiencies of the tools for aerosols non – lethal weapons generation and detecting devices.

The actuality of this work is stipulated by the modern development of information and computer technologies allowing for creating the imitation mathematical models of efficiency of aerosols non – lethal weapons influence on detecting devices and predicting the ranges of their applicability. Finally the mathematical modelling gives the grounds for formulating the requirements to new detecting tools.

The zone of efficiency of EOS or LSC is introduced as a criterion of their efficiency. This criterion for EOS is the dependence of  $D^*(\alpha)$  on the distance  $D$  for detecting the object with the probability  $P$  exceeding a given threshold level  $P^*$  on the detection angle  $\alpha$ . In the case of LCS the efficiency zone  $Dc^*(\alpha)$  is defined as the dependence of the distance of a contact with the probability of error less than an acceptable level  $P^*_{\text{om}}$  on the azimuthal angle  $\alpha$  of the receiver LCS.

The efficiency zones can be entirely found on solving the equation connecting the distance of operation of the device with a given probability level. In doing this the known coefficient  $K_q(\alpha)$  of relative lowering the signal-to-noise ratio (SNR) is introduced accounting for the interference environment.

Now let us consider the second problem: evaluation of the efficiencies of the tools for interfering aerosols non – lethal weapons generation. In this case the efficiency of the interference is characterised by the value of relative change of the probability for detecting the object or the error probability when receiving a communication, while the dependence  $K_{\text{эф}}(\beta)$ . Для решения данных задач разработаны алгоритмы и программы расчета.

The code for evaluating the aerosol interferences was developed on the basis of the system of visual programming DELPHI in the medium WINDOWS.

The interface "PC - user" assumes the consequential entering the initial data into PC after a PC request, the indication of the results of calculation (in the form of tables and plots) and a correction of the data (if necessary) with repeating the calculation-indication cycle. The automatic entering the reference data is provided for simplifying the operation with a set of initial data on the characteristics the observation (communication) situation and the interference. In addition, for user's convinency the shortcut windows are created, containing necessary recommendation on working with the code, admitted limitations and assumptions, the values of the situation characteristics of the object and interference admitted as reference ones and other information.

Hence, the mathematical model is developed for evaluating the efficiency of the aerosols non – lethal weapons interference allowing a prediction of the applicability of these or those communication (detection) tools.

**Key words:** efficiency, aerosol, influence, optical-electronics