

Roshchupkin E., Candidate of Engineering Sciences, Senior Researcher  
Herasimov S., Doctor of Engineering Sciences, Professor  
Roshchupkina A.

Ivan Kozhedub Kharkiv National Air Forces University, Kharkiv  
Kukobko S., Candidate of Engineering Sciences, Senior Researcher

State Research Institute for Testing and Certification of Weapons and Military Equipment, Chernihiv

**COMBINED METHOD FOR AIR OBJECTS MOTION PARAMETERS DETERMINING BY THE RADIO  
SYSTEM WITH A QUASI-CONTINUOUS RADIATION SYSTEM**

Using of multi-position radio systems is one of the promising ways to increase airspace monitoring information support. In the anti-aircraft systems stations with quasi-continuous radiation, which can be combined into a single system, are widely used. This allows getting some of advantages associated with a narrow bandwidth of the processed signals. These include the small width of the radiation pattern main lobe, high: the signal-to-noise ratio, the measurement of radial velocity accuracy and noise immunity. At the same time, there are a number of disadvantages, for example, the measuring ranges ambiguity and the need to eliminate it. This increases the time of air objects motion parameters measurement, therefore, the total radiation time during shelling. This contradicts the modern view of ensuring the anti-aircraft systems survivability, which recommending radiation time reduction, provided that the remaining indicators are preserved.

The total radiation time reducing during the shelling of air objects is possible by more accurate measurements of their motion parameters, which are used in the guided weapons guiding. The method of air objects movement parameters determining by radio system with quasi-continuous radiation is proposed. The method takes into account not only the results of spherical coordinates (azimuth, elevation, range and their increment) measurements, but also the results of radial velocities measurements. At the same time, it is taken into account that one of the information processing problems in multi-position radio systems is using of the own coordinate system in individual points of the system. This necessitates the received coordinate information recalculation into a single coordinate system with its subsequent issuance to the final consumer (anti-aircraft system). The nonlinear relationship of the spherical coordinates and radial velocities estimates, obtained by separate means, with the single coordinate system (usually rectangular) in the fluctuation measurement errors presence leads to the appearance of systematic errors that must be taken into account. This is due to the fact that final consumers include narrowly targeted antenna systems with limited search capabilities. The systematic errors in coordinate information can lead to an increase in the time spent on target designation or the inability to complete the task.

It is shown that taking into account the correlation matrices of targets coordinates recalculating errors, when combining estimates of spherical coordinates and radial velocities obtained from several information sources, makes it possible to increase the accuracy characteristics of air objects motion parameters estimates. Improving the accuracy characteristics of air objects motion parameters estimates increases the accuracy of guided weapons guidance and, as a result, reduces the required radiation time during air target shelling.