

# Investigating Ranging Channel Algorithms of Air Traffic Control System

I. V. Knyazev, Yu. N. Panasyuk

*Tambov State Technical University, Tambov*

**Key words and phrases:** automated air traffic control systems; computer simulation; filtering; rangefinder; tracking systems.

**Abstract:** The paper studied two different filtration algorithms of automated air traffic control system. For advanced filtration algorithm with variable coefficients real and potential precision characteristics were studied. And for simple  $\alpha$ - $\beta$  filtration algorithm only real characteristics were investigated. Potential errors were determined by filter simulation. Simulation results showed that the synthesized algorithm has high potential accuracy. Since potential errors were suitable, it was necessary to investigate real accuracy of the phase coordinates estimation. Here, computer simulation is a simulation of the input signals and the processing of these signals using the synthesized algorithm. Simulated input signal is a true simulation of the phase coordinates and observation noise. Observation noise was simulated by random number generators.

To determine the standard deviation of the phase coordinates one hundred samples were used. As the input signal was used range variation during passing maneuvers aim model approach “big box”. As an observation noise a centered white noise with 200-meters standard deviation was used.

The study results showed that filters with variable coefficients have a better precision, taking into account the spatial position of the target. This is explained by much better matched filter process models of the aircraft, a more accurately extrapolated range, and an increase in the accuracy of extrapolation, which in its turn, leads to an increase the accuracy of the final estimation.

---

© И. В. Князев, Ю. Н. Панасюк, 2014