Optimization of Data Transfer in Cooperative Surveillance Systems

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Abstract—**In the paper, based on the consideration of the problem of detecting signals in cooperative observation systems as a test of two hypotheses, the optimal rule for detecting signals in the case of an arbitrary cost function is obtained and it is shown that the best value for the Bayesian value should be compared with the threshold of the generalized likelihood ratio, and the threshold value does not depend on the algorithm and the quality of the interrogator, but is completely determined by the decision costs for the system as a whole. The method of the response signals processing of cooperative observation systems with preliminary inter-period processing proposed in the work allowed to improving the quality of air objects detection and reducing the effect of the aircraft's responder readiness factor on the quality of the air facility detection, which leads to a corresponding improvement in the quality of information support for decision-makers.**

Keywords—cooperative surveillance systems; aircraft responder; quality of information support; information support; response signal; readiness coefficient.

REFERENCES

[1] A. Farina and F. Studer, *Cifrovaja obrabotka radiolokacionnoj informacii* [*Digital processing of radar information*]. Moscow, Russia: Radio i svyaz, 1993. (In Russian).

[2] V. Chernyak, *Fundamentals of Multisite Radar Systems: Multistatic Radars and Multistatic Radar Systems*. Gordon and Breach Science Publishers, CRC Press, 1998.

[3] S. Pjatko and A. Krasnova, *Avtomatizirovannye sistemy upravlenija vozdushnym dvizheniem: Novye informacionnye tehnologii v aviacii.* [*Automated air traffic control systems: New information technologies in aviation*]. Saint-Petersburg, Russia: Politehnika, 2004. . (In Russian).

[4] I. Obod, I. Svyd and I. Shtykh, *Zavadozakhyshchenist' zapytal'nykh system sposterezhennya povitryanoho prostoru: monohrafiya* [*Interference protection of questionable airspace surveillance systems: monograph*]. Kharkiv: KhNURE, 2014. (In Ukrainian).

[5] Stevens M.C.: Secondary Surveillance Radar, Artech House, Norwood 1988.

[6] E. Kim and K. Sivits, "Blended secondary surveillance radar solutions to improve air traffic surveillance", *Aerospace Science and Technology*, vol. 45, pp. 203-208, 2015. DOI: 10.1016/j.ast.2015.05.018.

[7] Ueda T, Shiomi K, Ino M and Imamiya K. "Passive Secondary Surveillance Radar System for Satellit Airports an Loca AT Facilities". *Proc. of 43rd Annual Air Traffic Control Association*, Atlantic City, NJ, USA, 1998.

[8] T. Otsuyama, J. Honda, K. Shiomi, G. Minorikawa and Y. Hamanaka, "Performance evaluation of Passive Secondary Surveillance Radar for small aircraft surveillance", *2015 European Radar Conference (EuRAD)*, 2015. DOI: 10.1109/EuRAD.2015.7346348.

[9] Y. Ahmadi, K. Mohamedpour and M. Ahmadi, "Deinterleaving of Interfering Radars Signals in Identification Friend or Foe Systems", in *Proc. of 18th Telecommunications forum TELFOR*, TELECOMMUNICATIONS SOCIETY - Belgrade, ETF School of EE, University in Belgrade, IEEE Serbia & Montenegro COM CHAPTER, 2010, pp. 729-733.

[10] P. Ray, "A novel pulse TOA analysis technique for radar identification", *IEEE Transactions on Aerospace and Electronic Systems*, vol. 34, no. 3, pp. 716-721, 1998. DOI: 10.1109/7.705881.