METHODS CONTROL RADIOASTRONOMY OBSERVATIONS AND PROCESSING OF COSMIC RADIO SOURCES

E.A. Isaev[1,2]

[1] Pushchino Radio Astronomy Observatory ASC LPI, Pushchino, Russia, *is@itaec.ru*
[2] National research university Higher school of economics, Moscow, Russia

ABSTRACT. In this paper the following methods represented: control of the radio astronomical observations using the estimation results, making decisions on the detection of cosmic sources, taking into account noise and interference, and recognizers classes of cosmic radio sources to the maximum of a posteriori probability (Bayesian approach). The problem researched is about storing and transferring large amounts of scientific information from cosmic radio sources to consumers.

Key words: information systems, computational biology, parallel processing system.

The method control of radio astronomical observations using the estimation results, which will significantly increase the efficiency of radio astronomical observations is considered in this work. There is a wide variety of assessment systems that require management procedures. On the other hand, there is not a smaller variety of control systems that require the estimation procedure. Schemes of these systems are provided.

In theory of detection and estimation of the parameters of radio signals some models are used. The model should, on the one hand, meet demand of its proximity to the real signal, and on the other hand allow you to carry out a theoretical analysis, which can be extended to more general cases. The method of decision making of detection of cosmic radio sources considering the noise and interference with the detection of the optimality criterion according to which you can choose the best one (likelihood ratio).

We use Bayesian approach for the method of recognition for classes of cosmic radio sources to the maximum of posteriori probabilities. The Bayesian approach is based on the theorem, which states that if the frequency function of each class is known, the required algorithm can be written in explicit analytic form. Moreover, this algorithm is optimal, ie, it has a minimal error rate.

Breakthrough in electronics, computing and information technology over the past 50 years have led to the fact that one of the dominant trends in modern science is the significant increase in the recorded and received data and the associated problems of storage and processing of this information. Synthesis of science and IT leads to the realization of the fact that a significant breakthrough in the knowledge of the world is possible only in case of possibility of processing of extra-large amounts of information and that the role of information and its processing in research is crucial. In particular, astronomers have faced with the fact that they need to handle the flow of information to several terabytes per day (more on the sites http://www.astrogrid.org/ and http://www.euro-vo.org/). Approximately everywhere, especially in research, there is a rapid replacement of the analog digital technologies. Examples of these trends in radio can be projects of unique and ambitious generation of radio telescopes: Atacama Large Millimeter Array (ALMA), Square Kilometer Array (SKA), Low Frequency Array (LOFAR) and others. This paper investigated on modern radiotelescopes task processing, storage and transmission of radio astronomical data.