

A Decision Support System (DSS) for Developing Programs of Scientific and Applied Research and Experiments on the Russian Segment of the ISS

Boris Zagreev and Roman Repchenkov

Central Research Institute of Machine Building (TSNIIMASH)

4, Pionerskaya str., Korolev, Moscow reg., 141070, Russia

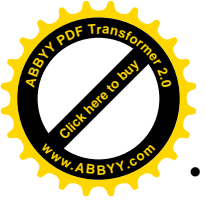
This paper deals with optimal planning of medium-term program of space experiments being conducted on the Russian segment of the International Space Station (ISS).

Currently, due to expansion of the number of proposals concerning new space experiments as well as those being prepared and conducted there is a need for increase of efficiency of expert procedures which identify priorities and develop programs of scientific and applied research and experiments on the Russian segment of the ISS. To solve this problem the DSS-ISS software was developed. The DSS-ISS Database was designed so that the developed software could solve a wide range of problems associated with multicriteria evaluation and ranking of alternatives. The DSS-ISS employs the methodology of decision support systems invariant to the application environment.

At first stage one should expertize application to conduct space experiments by vector criterion based on a customer value system. The output of this stage is priorities among space experiments.

Planning and forming of an experimental program proceeds next. Selection of space experiments to be included into the program is governed by the following limitations:

- weight and dimensions of scientific instruments to be delivered
- weight and dimensions of recoverable packages and components of scientific equipment (consumables)
- scientific equipment power consumption



- time outlays
- information support
- availability of special conditions to conduct space experiments
- funding.

Some of the resources can renew themselves at regular intervals. However available resources are insufficient to conduct all demands of space experiment developers. So there is a need for a reasonable plan of the research program. Within this plan an efficiency criterion may include the following goals:

- maximize total practicality of activities;
- minimize weighted average time to wait the beginning of experiment activity;
- minimize consumption of some types of resources.

This task belongs to the class of combinatorial integer programming. The developed DSS-ISS allows to employ various methods to solve such tasks in accordance with preferences of a decision maker.