

## AN SV-1 AUTOMATED SOFTWARE PACKAGE FOR VISION PROBLEMS

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*A software package intended to solve a number of problems of vision theory is described.*

The adaptation of the well-known Monte Carlo algorithms for solving the problems of vision theory and development of new algorithms has been performed in the Institute of Atmospheric Optics of the Siberian Branch of the Russian Academy of Sciences for some years. We have created an SV-1 automated software package comprising thirty two programs integrated by the service program into the convenient means for imitational modeling of the problems of the object observation through the atmosphere. In particular, the following problems of the vision theory can be solved using this software package:

1. Calculation of the system characteristics including the point spread function, optical transfer function, solar haze intensity, illumination, and the magnitude of the adjacency effect.

2. Calculation of the outgoing radiation.

3. Calculation of the brightness image of the given object distorted by the scattering medium (using the algorithms of the Fast Fourier Transform (FFT)).

The necessary characteristics can be calculated taking into account the scattering of any multiplicity in the aerosol-gaseous cloudless atmosphere for wide spectral range including the UV, visible, and near-IR ranges of the spectrum. The possibility for assigning the optical situations imitating the presence of the arbitrary number of the continuous cloud layers which screen the object from the observer is provided. Both plane and spherical models of the Earth's atmosphere can be considered virtually at any observation angles and positions of the external source.

The software package is intended to operate with the IBM PC AT/286-386 computer. The computer programs were written in FORTRAN-77. The management program of the SV-1 software package was written in PASCAL. This program implements the following functions:

- interactive regime of operation with the user,
- interface with database,
- opening of files with data necessary for calculations,
- call of the programs implementing the computer algorithms.

The following means are available to provide the interactive regime of operation with the user:

1) Menu system comprising the menu of the operational modes, menu of the types of problems which can be solved with the help of this software package, and menu intended to select the initial data.

2) Request system for input of initial data.

3) Help system for using the software.

Figures 1 and 2 show the operational block diagram of the management program as well as the block diagram of the menu system.

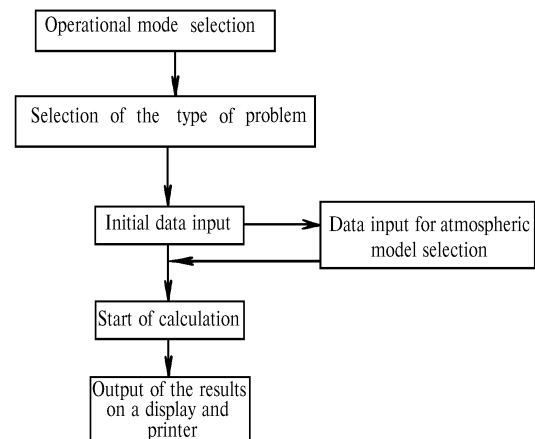


FIG. 1. The operational block diagram of the management program.

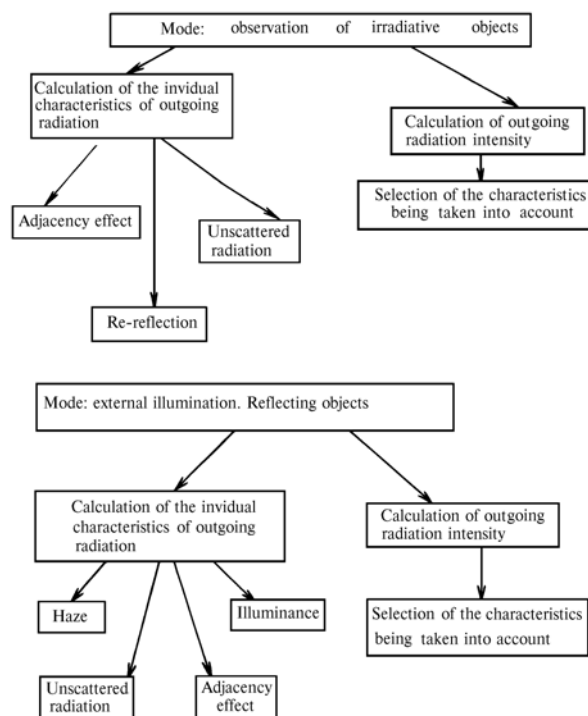


FIG. 2. The block diagram of the menu system of the operational mode and the problem types.

The software package contains the knowledge of its possibilities that allow the operator, who is not specialist in the field of the radiative transfer theory in the dispersed media, to implement it.

In conclusion we note that the second version of the software package is currently under development and it comprises the block of imitational modeling of the re-reflection

interference and database on the optical constants of solar radiation. The version under development is compatible with any database on the optical characteristics of the channel of propagating the UV, visible, and IR radiations.

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