## Automatic Analysis of Images and Signals Victor S. Abrukov and Evgeny V. Smirnov Physical-Technical Faculty, Chuvash State University victor@chuvsu.ru Moskovsky prosp., 15, Cheboksary, 428015, Russia

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Problems of image analysis are main problems in different fields of scientific and applied research. The automation of the solution of these problems is a main task for development of diagnostics and control system. A short description of a new approach and computer program (A&CC) that were developed in last two month for decoding and analysis of image are presented in the paper. The method that can be named as method of consecutive painting of image was used for development of A&CC. The A&CC allows to obtain various geometrical and statistical parameters of object that can be represented as a collection of separate parts. Among them: maximum cross sizes of every individual part of object image, its square and perimeter, histogram of individual parts with respect to size as well as with respect to type. The process of decoding and analysis are fully automated. A man (operator) should only locate the file of the image in the directory, where there is a main executable file, and to start it.

The A&CC can be used for scientific and applied research in the wide field of science and industry. A task of analysis of particles ensemble image (for example, the image of engine injector) can be taken as the simple example of typical tasks, but all tasks, in which ones the geometrical parameters of individual parts of the object image are the significant factors, can be solved with the help of the A&CC.

The computer code of the program is simple and fast in fulfillment. Therefore the program can represent the special interest for the analysis of the non-stationary images, for registration of appearance (or disappearance) of some parts of the image as well as for registration of random events. It can be used for analysis in real-time mode of the video image, for example for the analysis of structure of burning surface of propellants. Additional possibilities of the A&CC can be developed by means of usage of artificial neural networks technologies. It usage can allow to use the approach for the analysis of non-quality images and images with noise. It is important for creation of diagnostics and control system aimed to industry diagnostics and control. Additional possibilities of the A&CC usage deal with the solving of problems of recognition and filtration of images.

The first results of implementation of the A&CC to a problem of automation of analysis of spray image are represented below. The image of spray (Oxford Lasers' LASERSTROBE) is presented on fig. 1 and one of the moments of work of the computer code is presented on fig. 2. On the fig. 3 the histogram of spray parts are shown. The particles ensembles are not only possible objects of research. As we believe the A&CC can be used at creation of the systems of diagnostic and control for solving of various tasks in the field of analysis of combustion dynamics in particular turbulence parameters in reacting flows and structure of multi-phase detonations.



Fig. 1. Model image of particles ensemble



Fig. 2. One of the moments of operation of a computer program.



Fig. 3. Histogram of particles with respect to size along x-axis.