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INTERNATIONAL LASER CENTER

Project Title: **Shadow Mask Inspection**

Subproject #2 **“Shadow Mask Inspection Based on Fourier Filtering”**

FINAL REPORT

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ABSTRACT

This report summarizes the results obtained by the computer simulation of a shadow mask inspection system based on Fourier filtering principles. The main component of such a system is an optical Fourier filter that provides real-time image processing, making further defect detection more simple and effective. In the output plane of the optical Fourier processor thus constructed, defects of different kinds look highlighted within the inspected area and can be distinguished from normal holes. Thus, the proper filter design and optimization of its parameters are of great importance.

The next stage of the detection process supposes applying some detection algorithm to the filtered image. Two kinds of such algorithms have been tested. The first one, so-called “2-D algorithm”, is based on the computer analysis of the two-dimensional filtered image of the shadow mask. The second algorithm is referred to as “line-integrating algorithm”. The first approach is more universal and effective, but requires more computational resources. Nevertheless, it may be used in real-time systems. The line-integrating approach shows much higher processing speed, although reduces the accuracy of determining one of the two coordinates of a detected defect.

The problem of reducing a dust-induced coherent noise by means of low-coherence illumination and motion-sensitive detection was also considered. So far, these methods were tested in combination with the line-integrating algorithm, though their usage along with the 2-D algorithm is also possible and promising.

In **Part 1** of the report, the basic principles of the system operation and the algorithms used for its computer simulation are presented.

The main results of the Sub-project are summarized in **Part 2**.

Table of contents

Part 1. Theoretical Background and Simulation Algorithms.....	4
1.1 Mask Generation	4
1.2 Defect Generation.....	6
1.3 Optical Fourier Processor Simulation.....	6
1.4 Fourier Filter Generation	7
1.5 CCD Detector Simulation	9
1.6 Optical System Defects and Low Coherence Problem.....	11
1.7 Detection Algorithms	15
1.7.1 2-D algorithm	16
1.7.2 Line-integrating algorithm.....	19
Part 2. Results.....	22
2.1 Filter optimization.....	22
2.2 System performance with the 2D detection algorithm	23
2.2.1 Influence of large-scale inhomogeneity of illumination beam.....	23
2.2.2 Influence of small-scale inhomogeneity of illumination beam	24
2.2.3 Influence of coherence length of illumination source	24
2.2.4 Influence of regular hole size variation	25
2.2.5 Influence of defect type and size	25
2.2.6 Requirements for 2D CCD detector	27
2.3 System performance with the line-integrating detection algorithm.....	27
2.3.1 FOV optimization	27
2.3.2 Influence of large-scale inhomogeneity of illumination beam.....	28
2.3.3 Reduction of negative influence of dust particles by “motion-sensitive detection”..	28
2.4 Summary and conclusions.....	31

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