ON THE RESTORATION OF THE BLURRED IMAGE OF A MOVING OBJECT

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I. INTRODUCTION

The task of restoring a blurred image of a moving object is well studied. In the case when the velocity of the object is known a priori, its solution is reduced, as is known, to the reversal of a discrete convolution.

However, in the case of restoring a blurred image obtained at the camera resolution limit, the traditionally used approach, based on replacing the integral in the convolution equation with the corresponding quadrature formula, leads to the need for interpolation of the original image, which is associated with an increase in the size of computer memory used in calculations. The report will show that this additional memory consumption can be avoided if, when sampling, the convolution equations are based not on quadrature formulas, but on the Kotelnikov interpolation row.

II. RESULTS

Content: 1. Formulation of the problem. 2. Reduction restoring blurred image problem to the solution of first kind convolution type Fredholm integral equation. 3. Discretization of first kind convolution type Fredholm integral equation based on the trapezoids quadrature formula. 4. Discretization of first kind convolution type Fredholm integral equation based on the Kotelnikov interpolation row. 5. The influence of edge effects and the need to reconstruct the blurred edges of the image. Elimination of errors edges reconstruction by inverting convolution by Tikhonov regularization method. 6. The results of numerical experiments showing that if the value of the image "smudge" is expressed as an integer number of pixels, then the new approach works just as well as the traditional one based on the use of quadrature formulas. 7. The results of numerical experiments showing that the proposed method works even if the value of the image "smudge" is expressed in fractions of a pixel. At the same time, interpolation of the original image is not required.

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