

Input Information in the Approximate Calculation of Two-Dimensional Integral from Highly Oscillating Functions (Irregular Case)

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ABSTRACT

Nowadays, methods for digital signal and image processing are widely used in scientific and technical areas. Current stage of research in astronomy, radiology, computed tomography, holography, and radar is characterized by broad use of digital technologies, algorithms, and methods. Correspondingly, an issue of development of new or improvement of known mathematical models arose, especially for new types of input information. There are the cases when input information about function is given on the set of traces of the function on planes, the set of traces of the function on lines, and the set of values of the function in the points. The paper is dedicated to the improvement of mathematical models of digital signal processing and imaging by the example of constructing formulas of approximate calculation of integrals of highly oscillating functions of two variables (irregular case). The feature of the proposed methods is using the input information about function as a set of traces of function on lines. The estimation of proposed method has been done for the Lipschitz class and class of differentiable functions. The proposed formula is based on the algorithm, which is also effective for a class of discontinuous functions.

KEYWORDS: Highly oscillating functions; Two-dimensional functions; Integrals of highly oscillating functions of two variables

DOI: https://doi.org/10.1007/978-3-319-97885-7_36

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