M.L. Mozgaleva, P.A. Akimov

COMPUTATION OF CONVOLUTION OF FUNCTIONS WITHIN THE HAAR BASIS

The Wavelet analysis, that replaces the conventional Fourier analysis, is an exciting new problem-solving tool employed by mathematicians, scientists and engineers. Recent decades have witnessed intensive research in the theory of wavelets and their applications. Wavelets are mathematical functions that divide the data into different frequency components, and examine each component with a resolution adjusted to its scale. Therefore, the solution to the boundary problem of structural mechanics within multilevel wavelet-based methods has local and global components. The researcher may assess the influence of various factors. High-quality design models and reasonable design changes can be made.

The Haar wavelet, known since 1910, is the simplest possible wavelet. Corresponding computational algorithms are quite fast and effective. The problem of computing the convolution of functions in the Haar basis, considered in this paper, arises, in particular, within the wavelet-based discrete-continual boundary element method of structural analysis. The authors present their concept of convolution of functions within the Haar basis (one-dimensional case), share their useful ideas concerning Haar functions, and derive a relevant convolution formula of Haar functions.

Key words: wavelet analysis, Haar basis, convolution, structural analysis, discrete-continual boundary element method.

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About the authors: **Mozgaleva Marina Leonidovna** — Candidate of Technical Sciences, Associated Professor, Department of Computer Science and Applied Mathematics, **Moscow State University of Civil Engineering (MGSU)**, 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; marina.mozgaleva@gmail.com; +7 (499) 183-59-94;

Akimov Pavel Alekseevich — Doctor of Technical Sciences, Associate Member of the Russian Academy of Architecture and Construction Science, Professor, Department of Computer Science and Applied Mathematics, **Moscow State University of Civil Engineering (MGSU)**, 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; pavel.akimov2@gmail.com; +7 (499) 183-59-94.

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