HARMONIC WAVELETS AND ASYMPTOTICS OF THE SOLUTION TO DIRICHLET PROBLEM IN AN ECCENTRIC ANNULUS

M.A. Zarenok

Belarussian State University, Mechanical-Mathematical Faculty

Nezavisimosti ave 4, 220030 Minsk, Belarus

zarenokma@gmail.com

It is constructed a basis of harmonic function in an eccentric annulus and built a solution of Dirichlet's problem in this domain. This approach is based on the recent results by Yu.N.Subbotin and N.I.Chernykh which describe an asymptotic of the solution to Dirichlet problem in the circle with a small perforation at its center in terms of specially constructed harmonic wavelet basis.

In order to construct a basis of wavelets in the case of eccentric annulus

$$D = \{\zeta \in \mathbb{C} : |\zeta| < 1, |\zeta - a| > \rho\}, \quad |a| < 1,$$

we find a conformal map of D onto the concentric annulus

$$\Omega = \{z \in \mathbb{C} : r < |z| < 1\}.$$

such that the centers of perforation (a and 0) correspond to each other. This map has a form

$$z = \lambda \frac{\zeta - a}{\zeta - b},$$

where parameters $\lambda \in \mathbb{C}$ and $b \in \mathbb{C}$, $|b| > 1$, are calculated explicitly.

By changing variables in the Subbotin — Chernykh basis of harmonic wavelets we obtain a new family of the harmonic functions, which is proved to be a basis of harmonic wavelets for the eccentric annulus D.

An asymptotic of the solution to the Dirichlet problem for the eccentric annulus D is found and speed of convergence as $\rho \to 0$ is estimated.

The work is partially supported by the Belarusian Fund for Fundamental Scientific Research.